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# PacifiCorp

## Idaho Low Income Weatherization Program Evaluation for Program Years 2013 - 2015

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## Table of Acronyms

Acronyms	Meaning
ARRA	American Reinvestment and Recovery Act
CAPAI	Community Action Partnership Association of Idaho
CSA	Conditional Savings Analysis
CFL	Compact Fluorescent Light Bulb
EICAP	Eastern Idaho Community Action Partnership
IDHW	Idaho Department of Health and Welfare
kWh	Kilowatt-hour
LIHEAP	Low Income Home Energy Assistance Program
LIWP	Low Income Weatherization Program
NEB	Non-Energy Benefit
PCT	Participant Cost Test
PTRC	PacifiCorp Total Resource Cost Test
PUC	Public Utilities Commission
RIM	Ratepayer Impact Measure Test
SEICAA	SouthEastern Idaho Community Action Agency
SIR	Savings-to-Investment Ratio
TRC	Total Resource Cost
UCT	Utility Cost Test
USDHHS	United States Department of Health & Human Services
USDOE, DOE	United States Department of Energy
WAP	Weatherization Assistance Program

# 1. Executive Summary

Opinion Dynamics presents its evaluation findings for the Rocky Mountain Power Low Income Weatherization Program (referred to as the “Program” throughout this report) in operation in the state of Idaho during the 2013 through 2015 program years. We performed both an impact and process evaluation and results from these are presented in the report. Additionally, we conducted payment and arrearage analyses to estimate non-energy program benefits. In this report, we also include cost-effectiveness test results using several approaches. Navigant Consulting performed the cost-effectiveness tests.

Two Idaho non-profit agencies known for serving low income communities implement the Program: SouthEastern Idaho Community Action Agency (SEICAA) and Eastern Idaho Community Action Partnership (EICAP). These agencies provide energy efficiency services mostly targeted towards weatherization to existing single family (including manufactured) and multi-family homes, so long as the multi-family property is at least 66% occupied by low income qualifying tenants. “Low Income” qualifications follow federal guidelines and eligibility is based on 200% of federal poverty guidelines. Clients receive energy efficiency measures at no cost to them. Instead, the Rocky Mountain Power reimburses the agencies for 85% of the installation cost. The agencies receive additional funds to operate the program from the U.S. Department of Energy (USDOE) and the U.S. Department of Health and Human Services (USDHHS). These funds are allocated to the Idaho Department of Health and Welfare (IDHW) and administered on its behalf by the Community Action Partnership Association of Idaho (CAPAI). CAPAI also provides oversight of the weatherization agencies. Agencies are also reimbursed for administrative costs.

Opinion Dynamics conducted an evaluation of the Program on behalf of the utility for the 2013 through 2015 program years. The evaluation objectives were to: (1) document and measure effects of the program (energy and non-energy); and (2) identify areas of potential improvement. To quantify energy benefits, we conducted an impact evaluation using a consumption analysis with a comparison group to estimate the ex-post net annual energy savings attributable to the Program. To quantify non-energy benefits such as reduced costs and external payments, we conducted an assistance payment analysis and an arrearage analysis of the treatment and comparison groups. We also conducted a process evaluation based on a program materials review, in-depth interviews with agency staff (SEICAA and EICAP), and client responses to a telephone survey. The telephone survey asked about client satisfaction with the program and implementers, program barriers and bottlenecks, best practices, and any opportunities for improvement. Last, this report includes the cost-effectiveness test results supplied by Navigant Consulting.

## 1.1.1 Impact Results

For the impact evaluation, we verified Program participation through participant telephone surveys. All surveyed participants (n=21) verified they participated in the program and received measures. We conducted a consumption analysis to estimate the electric savings. We applied a Conditional Savings Analysis (CSA) model to estimate weather-normalized, Program-induced energy (kWh) savings based on differences between participant consumption data and the comparison group. The result shows that the average annual net energy savings per participant for the 2013-2015 program years is 1,185 kWh.

This estimate is lower than the energy savings estimated for the Program in the previous evaluation. Lower savings can result from a variety of factors such as the mix of measures installed, as well as characteristics of the clients who participated in the Program. During the 2013-2015 program years, no participants replaced furnaces, but a total of 16 furnaces were replaced during the 2010-2012 program years. Furnace replacements are a significant source of energy savings, particularly if the previous units are very old. Another contributing factor to smaller energy savings may be from occupancy changes. Over one-quarter of survey

respondents indicated that someone in the household retired or became unemployed since the measures were installed which may have increased the hours of use for heating and water heating which could then decrease energy savings. In Table 1, we present the ex-post net savings for each program year and in total. Overall, the Program achieved 90% of its ex-ante gross savings for the evaluation period.

**Table 1. Ex-Ante Gross and Ex Post Net Energy Savings (kWh)**

Program Year	Participation	Ex-Ante Gross Energy Savings (kWh)	Ex-Post Net Energy Savings (kWh)	Realization Rate
2013	74	101,771	87,690	86%
2014	41	52,320	48,585	93%
2015	53	68,016	62,805	92%
<b>Total</b>	<b>168</b>	<b>222,107</b>	<b>199,080</b>	<b>90%</b>

The net savings may reflect both measure savings and behavior changes given that many participants took recommended actions to save energy beyond the measures installed. The Program is installing deep energy savings measures that will likely provide persistent savings over time as many of the measures have a long effective useful life such as insulation. Further, most participants will reap these savings over a long period since most of them (81%) own their homes. The Program's decision to move from CFLs to LEDs in 2016 is a solid one given the current lighting market conditions, i.e. Energy Independence and Security Act (EISA) legislation is slowly removing incandescents from store shelves and CFLs are more prevalent in homes. Half of the survey respondent (52%) said they already had CFLs in their home before participating. Forty percent (n=7 out of 17) stated that all CFL bulbs were still installed, which means that most program participants removed some or all of the CFL bulbs. The Program's decision to move from CFLs to LEDs will likely reduce the removal rate.

### 1.1.2 Process Results

The process evaluation examined program operations from multiple perspectives. Rocky Mountain Power and its implementers, SEICAA and EICAP, have worked together for several years to deliver the Program. Over this time, they have developed expertise in delivering the program despite its complex funding mechanisms. Combining the funds from Rocky Mountain Power with additional money from government organizations allows the program to reach more utility clients and demonstrates a best practice in low income energy efficiency program delivery.<sup>1</sup> It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already.

The agencies can serve most clients that qualify relatively quickly; most often within three months of applying with some exceptions. More than half of the surveyed participants (62%) reported wait times of less than 3 months. Still, approximately 10% of clients stated that they had to wait a year or longer from their application processing date. SEICAA served its entire waiting list for the Program while EICAP reported that some clients on its waiting list may not receive services for up to two to three years. This may be indicative of the difference

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<sup>1</sup> Kushler, Martin, York, Dan and Witte, Patti, "Meeting Essential Needs: The Results of a National Search for Exemplary Utility-Funded Low-Income Energy Efficiency Programs", ACEEE Report Number U053, September 2005.

between the agencies in terms of how many clients they serve, as EICAP serves more clients than SEICAA. Amongst participants, 75% received EICAP services while 25% received SEICAA services. The agencies both noted that they work to restructure their waiting lists based on federally mandated Program priorities (such as serving the elderly, disabled, and homes with young children). EICAP noted that it reviews the wait list daily to re-prioritize applicants based on how long they have been waiting for services, as well as by cost of heating as a proportion of the household's income.

From the agency perspective, the program is operating smoothly. However, there are two key issues impacting participation rates and program administrative costs. The first issue is a structural barrier that is very common in low income weatherization programs across the country. Sometimes, the Program cannot install energy efficiency measures because other structural or safety issues in the home need to be addressed first and are not covered by the Program. The second issue is a client awareness issue where clients have difficulty self-reporting that they have electric heat, which is an eligibility requirement. Clients may say they have electric heat and the agencies may spend time arriving at the home and discovering that the client does not have electric heat and, therefore does not qualify for all weatherization measures.

The Program is helping to educate participants on ways to save energy beyond the direct-install measures. While energy education is not a formal part of this Program<sup>2</sup> and is offered through Rocky Mountain Power's Low Income Energy Conservation Education Program, agency staff still speak to Program participants about ways to save energy in the home. Coupling this informal energy efficiency education with home audits and measure installation is one way implementation staff can take advantage of their visits to help induce behavioral changes that may further reduce energy costs. It is also considered a best practice of energy efficiency programs designed to serve low income clients.<sup>3</sup> Almost all survey respondents recall receiving energy education from the Program and found it very helpful.

The Program is also going beyond energy and cost benefits by improving the health, comfort and aesthetics of the homes. In the telephone survey, we asked program participants if the air quality, appearance, and comfort were better, the same, or worse after they participated in the program. Eighty-six percent of respondents reported an improvement in comfort, 43% in air quality, and 48% in home appearance. No one reported that these home characteristics were worse since participation.

The Program is meeting client needs very well. Participant experience with the Program was very positive. Four in five (86%) participants reported that they were "completely satisfied" with the Program and 95% would recommend the program to others; consistent with previous program evaluation results.<sup>4</sup>

Rocky Mountain Power tried to increase awareness about its sponsorship of the Program with additional efforts in 2015. For example, clients now receive letters from Rocky Mountain Power thanking them for their participation after they receive weatherization services through the Program. However, the agencies are generally credited for the funding more than Rocky Mountain Power. Only 10% of surveyed clients identified Rocky Mountain Power as a funding source. It may take time for this information campaign to take effect and

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<sup>2</sup> Rocky Mountain Power provides \$25,000 annually for Low Income Energy Conservation Education.

<sup>3</sup> Ibid.

<sup>4</sup> Smith & Lehmann Consulting and H. Gil Peach & Associates, *Idaho Low-Income Weatherization Program Evaluation Report for Program Years 2010-2012*, Prepared for Rocky Mountain Power. January 26, 2015, page 27.

increase awareness concerning Rocky Mountain Power’s sponsorship of the services provided by EICAP and SEICAA.

### 1.1.3 Payment and Arrearage Analyses Results

To estimate some non-energy benefits from the Program, we compared the change in external assistance payments and arrearages for program participants and a comparison group. Table 2 presents the annual change in assistance payments annually and overall for the evaluation period. Assistance payments decreased by an average of over 40% for Program participants while it increased by over 60% for the comparison group. A net reduction in external payments of \$112 is the net benefit of the Program.

**Table 2. Payment Assistance Amounts Summary for Participants and Comparison Group**

Year	Participant Group				Comparison Group				Net Difference	Net Program Benefit
	Pre	Post	Change	% Change	Pre	Post	Change	% Change	Amount	
2013	\$ 229	\$ 128	\$ (101)	-44%	\$ 1,464	\$ 1,460	\$ (4)	0%	\$ 97	\$ 101
2014	\$ 278	\$ 128	\$ (149)	-54%	\$ 1,433	\$ 2,354	\$ 921	64%	\$ 1,071	\$ 149
2015	\$ 275	\$ 189	\$ (86)	-31%	\$ 2,245	\$ 4,976	\$ 2,731	122%	\$ 2,817	\$ 86
<b>Total</b>	<b>\$ 260</b>	<b>\$ 148</b>	<b>\$ (112)</b>	<b>-43%</b>	<b>\$1,714</b>	<b>\$2,930</b>	<b>\$1,216</b>	<b>62%</b>	<b>\$ 1,328</b>	<b>\$ 112</b>

In addition to a reduction in external assistance payments, we examined the change in arrearages. An arrearage is the unpaid ending monthly balance on a customer’s bill. To estimate this non-energy benefit, we calculated the change in arrearage payments for Program participants and compared this to the change in arrearage payments for the comparison group. Table 3 presents the findings from this analysis. The net difference in arrearage payments is \$17 per month, since arrearages decrease for the participant group and increase for the comparison group. However like the analysis above, the net difference does not represent the non-energy benefit because neither the participant group or the utility benefit from the increased arrearages paid to the comparison group. The net Program benefit is the \$5 reduction in monthly arrearages paid to the participants of the Program.

**Table 3. Arrearage Summary for Participant and Comparison Groups**

	Participant Group Arrearage				Comparison Group Arrearage				Net Difference	Net Program Benefit
	Pre	Post	Change	% Change	Pre	Post	Change	% Change	Amount	
Monthly Arrearage	\$ 38	\$ 33	\$ (5)	-14%	\$ 28	\$ 40	\$ 12	43%	\$ 17	\$ 5

### 1.1.4 Cost-Effectiveness Results

Navigant completed cost-effectiveness tests of the Program using various approaches: the PacifiCorp Total Resource Cost (PTRC) test, Total Resource Cost (TRC) test, Utility Cost (UTC) test, Ratepayer Impact Measure (RIM) test, and the Participant Cost Test (PCT). Opinion Dynamics and PacifiCorp provided the inputs to Navigant for their calculations. The PCT was considered “not applicable” and benefit/cost ratios were not calculated using this approach. The annual and evaluation period benefit/cost ratios are presented in Table

4 and show that the Low Income Weatherization Program is considered cost-effective based on the PTRC and TRC tests. Note that this Program uses the PTRC to determine cost-effectiveness.

**Table 4. Benefit/Cost Ratios - Low Income Weatherization**

Program Year	PTRC	TRC	UCT	RIM	PCT
2013	1.23	1.17	0.63	0.4	n/a
2014	1.24	1.18	0.64	0.4	n/a
2015	1.22	1.17	0.63	0.4	n/a
<b>2013-2015</b>	<b>1.23</b>	<b>1.17</b>	<b>0.63</b>	<b>0.4</b>	<b>n/a</b>

### 1.1.5 Recommendations

Based on the evaluation results, we recommend the following:

- Rocky Mountain Power is adhering to best practices by delivering the program through community-based agencies. SEICAA and EICAP have served as Program implementers on behalf of Rocky Mountain Power for years. It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already. Additionally, these agencies are knowledgeable about using funding from utilities in combination with government funding to expand the reach of programs. SEICAA and EICAP both demonstrate their understanding of program processes, requirements and funding mechanisms. Leveraging these type of agencies is a best practice in low income weatherization programs. **Rocky Mountain Power should continue to use the same Program implementers moving forward.**
- Rocky Mountain Power has tried to increase awareness about its funding of the program, given that the utility provides 85% of the costs of measures installed in participants’ homes. Most participants cannot recall who funds the Program and those that do often associate it with the agencies instead of the utility. Only 10% of surveyed clients identified Rocky Mountain Power as the funding source. In 2015, Rocky Mountain Power started to send letters and magnets to participants to thank clients for participating and to increase awareness of the utilities’ role in the program. **These efforts may help increase association of the Program with Rocky Mountain Power over time but the Program may also consider branding the agency staff who conduct the audits and installation services by wearing shirts with the Rocky Mountain Power name and logo.**
- Long waiting lists to receive weatherization services continue from one agency’s perspective, although that agency could not decipher the Rocky Mountain Power waiting list versus other utilities. It may not be a huge issue for Rocky Mountain Power clients given that 62% of survey respondents said the Program served them within 3 months of applying. SEICAA noted that it served all Rocky Mountain Power clients that qualified and still had remaining funds. The demand for services may be higher than what Rocky Mountain Power can provide, particularly for EICAP. **However, since EICAP exhausted their Program funding and SEICAA did not use all of its funding, Rocky Mountain Power may revisit the funding levels to each agency and consider giving more to EICAP and less to SEICAA.**
- Though the Program has been well received, it has had declining participation since 2012. The decline in participation could be due to several factors, including market penetration amongst the eligible

population and depletion of American Recovery and Reinvestment Act (ARRA) funding. **We recommend that Rocky Mountain Power take a historical look at participation amongst its low income population that likely has electric heat to determine how much of the market has been penetrated thus far. This exercise could also help to identify and target households that have not participated yet.**

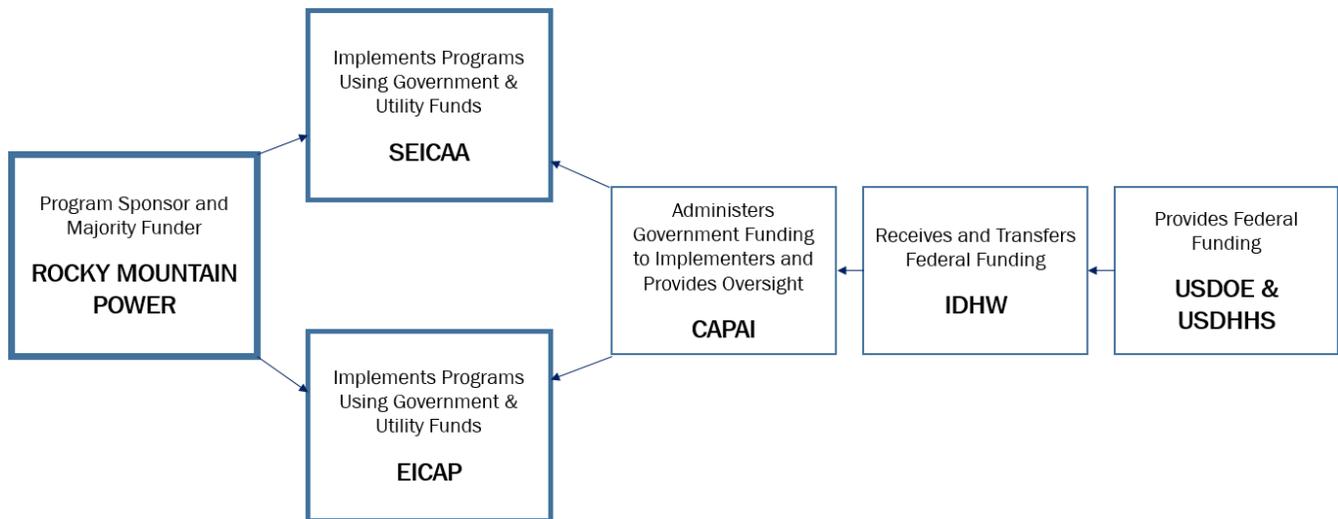
- The Program could reduce costs if agencies can verify that a client has electric heat before visiting the home. Clients have difficulty with correctly identifying whether their home uses electric heating. Currently, the agencies rely on clients to tell them if they have electric heat and then verify it by visiting the home. **We recommend that Rocky Mountain Power help the agencies determine if a client has electric heat through consumption records before visiting the home. The average electric consumption for low income households with electric heat could help agencies determine if a client is in the general ballpark before visiting the home.**
- Finally, the Program is struggling with an issue commonly found in low income weatherization programs throughout the country, i.e., overcoming the structural barriers to installing weatherization measures. These structural barriers are an issue impeding participation and cost-effectiveness. This issue is a quandary to most utilities who need to allocate funds directly to energy saving improvements, for cost-effectiveness standards, instead of structural and safety improvements that do not directly lead to energy savings. While other funding sources can help, it often is not enough. For most utilities, this remains an unsolvable dilemma. However, one electric cooperative in Arkansas advocated for a new tariff in the state that allowed for an innovative financing solution that directly solved this issue. The Pay-As-You-Save model, allows the utility to fund both structural and energy improvements and provides immediate net savings for the client. The client does not incur a debt obligation while the utility benefits from a low risk path to cost recovery through a charge on the bill that is less than the estimated savings from the upgrades. **We recommend that Rocky Mountain Power staff explore this innovating financing tariff that allowed a utility to address both structural and energy improvements through its low income weatherization program at no cost to the client.** More information on this innovate tariff and how it operates can be found in the embedded documents in Appendix B.

## 2. Introduction

Rocky Mountain Power’s Low Income Weatherization Program (the “Program”) provides energy efficiency services to eligible residential clients through a partnership with two non-profit weatherization agencies in Idaho: Eastern Idaho Community Action Partnership (EICAP)<sup>5</sup> and SouthEastern Idaho Community Action Agency (SEICCA).<sup>6</sup> Partnering with agencies that historically serve Idaho’s low income communities provides Rocky Mountain Power with access to the clients targeted by this program.

Rocky Mountain Power funds 85% of the cost of approved measures received by participants. To fund the remainder, the agencies leverage government funding through the Idaho Department of Health and Welfare (IDHW). The original sources of these funds come from the United States Department of Energy (USDOE) and the United States Department of Health and Human Services (USDHHS). These funds are administered by the Community Action Partnership Association of Idaho (CAPAI) and directed to SEICAA and EICAP. Leveraging utility, state and federal funding sources allows these agencies to provide comprehensive weatherization services to more low income households than they may have otherwise. Other exemplary utility-funded low income energy efficiency programs also bring together multiple funding sources and implement programs through social service agencies. We show the sources of funding and roles of oversight and implementation in Figure 1.

**Figure 1. Funding and Oversight for Rocky Mountain Power’s Low Income Weatherization Program**



<sup>5</sup> EICAP serves Bonneville County, Butte County, Clark County, Fremont County, Jefferson County, Lemhi County, Madison County and Teton County

<sup>6</sup> SEICAA serves Bannock County, Bear Lake County, Bingham County, Caribou County, Franklin County, Oneida County and Power County

### 2.1.1 Program Implementation

Program implementation by SEICAA and EICAP involves the following steps, which are described in further detail in the 2015 Idaho Energy Efficiency and Peak Reduction Annual Report:

- income verification based on CAPAI guidelines to ensure that participants qualify for program participation,
- energy audit using a U.S. Department of Energy approved tool to determine measures that are cost effective to install,
- installation of measures that have a Savings Investment Ratio of 1.0 or greater,
- post-inspections of all projects, and
- billing notification to Rocky Mountain Power, which includes the measures installed and the associated cost of each project, along with the associated invoice.

The Program is available to all existing single family and multi-family residential units, so long as the multi-family property is at least 66% occupied by low income qualifying tenants. “Low income” qualifications follow Federal low-income guidelines and income eligibility is based on 200% of federal poverty guidelines.

Agencies directly install measures for clients based on heating fuel-type and need. Measures vary by household, are classified as either “major” or “supplemental”, and could include the following during the evaluation period: CFLs, water pipe insulation, showerheads, aerators, infiltration, replacement windows, thermal doors, thermostats, health and safety measures, electric furnace repair and replacement, ceiling, floor, wall, and duct, insulation, attic ventilation, water heater repair and replacement and refrigerators.

### 2.1.2 Evaluation Objectives

Below we list the objectives of our evaluation of the Rocky Mountain Power Low Income Weatherization Program in Idaho and we include in parentheses the evaluation type in which the objective is covered:

- Document and measure effects of the Program (impact and process)
- Verify measure installation and savings (impact)
- Review Program operations (process)
- Document all other funding used by agencies to provide no-charge services to participants (process)
- Quantify non-energy benefits through payment analysis (payment/arrearage analysis)
- Provide data to support Program cost-effectiveness assessments (impact and payment/arrearage analyses)
- Identify areas of potential improvement (impact and process)
- Document compliance with regulatory requirements (process)
- Survey participants and agency staff (process)

In the remainder of the report, we include a description of the data collection and methodologies used to conduct the study, a presentation of the impact evaluation, the findings from the process evaluation, the assistance payment and arrearage analyses, and cost-effectiveness results.

## 3. Data Sources

In this section, we present the data sources used in this evaluation.

### 3.1 Program tracking data

We requested and received program tracking data for program years 2013 through 2016 to support both impact and process evaluation. These data are tracked at the measure level therefore program participants who received more than one measure or treatment are listed multiple times. Our examination of the data revealed that Rocky Mountain Power Company changed their Program tracking system after 2013, therefore some of the variables provided in the 2014-2016 program tracking data were not provided in the 2013 data. However, we received all necessary data fields to conduct both the impact and process evaluation components of the study.

We received the following key variables in the 2013 program tracking data:

- Client name
- Project name
- Project ID
- Cost recovery date
- Measure installed
- kWh/year savings
- Direct install costs
- Measure costs
- Account number (client identifier, provided in a different data extract)

The Program tracking data system used for 2014 participants and beyond differed from the system used in 2013. We received more variables per record, which was at the measure level. We received the following key variables in the 2014-2016 program tracking data:

- Client name, address, and phone number
- Project name
- Project ID
- Cost recovery date
- Project creation date
- Project last update date
- Measure category, type, sub-type, and name

- Direct install costs
- Measure costs
- Bill account number (a client identifier and is the same as Account number in 2013 program tracking data)
- Primary utility number (client identifier)

The Program tracking data systems did not include kWh/year savings at the measure level and assumed the same average savings per home. Because we conducted a consumption analysis for the impact evaluation, the kWh/year savings at the measure or participant level were not needed.

Note that while we did not evaluate the 2016 program year, we requested these data for the consumption analysis as well as the payment analysis. We used future program participants as a comparison group where participants of the program were matched to them based on zip code and average daily consumption.

We used the program tracking data to identify program participants and the measures they had installed to develop the participant telephone survey sample. During the survey, we asked respondents to verify their participation.

### 3.2 Client consumption data

We received client consumption data from January 2012 through November 2016 for clients who participated in the Program during the 2013 through 2016 program years. The 2012 consumption data allowed us to establish baseline energy usage for those clients who participated in the Program during the 2013 through 2015 evaluation years and for the comparison group. These data included monthly kWh usage and one of a few different client identifiers (e.g., bill account number or a primary utility number) thereby allowing us to relate the consumption data to Program tracking data.

### 3.3 Monthly external payment and arrearage records

The payment and arrearage analyses relied on monthly client assistance payments received and monthly arrearages amongst participants and the comparison group. Key client payment data we received included the following variables for program participants:

- Client identifier
- Date of billed amount (generally billed monthly)
- Balance forward amount (represents monthly customer arrearages)
- Client assistance payment amount
- Client assistance payment date

### 3.4 Agency interviews and participant survey data

Primary data collection activities included in-depth interviews with staff members at the SouthEastern Idaho Community Action Agency (SEICAA) and Eastern Idaho Community Action Partnership (EICAP). We also conducted a participant telephone survey. The agency interviews helped inform our review of Program operations, compliance with regulatory requirements, as well as major accomplishments and challenges related to Program implementation. We used information gathered through the participant telephone survey to verify the installation of measures, estimate lighting in-service rates, and inform process related Program findings.

## 4. Impact Evaluation

A total of 168 clients participated in the program over the 2013 through 2015 years. In the participant telephone survey, we asked respondents whether they recall someone coming to their home to provide weatherization services and perform energy efficiency upgrades. All surveyed respondents (n=21) confirmed their participation.<sup>7</sup> A list of the various measures installed from the most common, compact fluorescent light bulbs, to the least common, water heater replacement, is presented in Table 5 below. Other common measures include water pipe insulation, infiltration, windows, and thermal doors.

**Table 5. Idaho Participation Counts and Measures for Program Years 2013 to 2015**

Measures	2013	2014	2015	Total	Percent Treated
Total # of Treated Homes	74	41	53	168	100%
Compact Fluorescent Light Bulbs	68	40	49	157	93%
Water Pipe Insulation	58	35	49	142	85%
Infiltration	47	37	44	128	76%
Replacement Windows	38	23	39	100	60%
Thermal Doors	35	28	33	96	57%
Furnace Repair	34	26	29	89	53%
Health & Safety Measures	26	24	30	80	48%
Ceiling Insulation	26	24	27	77	46%
Floor Insulation	20	15	21	56	33%
Attic Ventilation	23	11	21	55	33%
Duct Insulation	19	12	10	41	24%
Water Heater Repair	6	4	9	19	11%
Wall Insulation	6	4	5	15	9%
Refrigerator Replacement	3	3	8	14	8%
Water Heater Replacement	-	1	1	2	1%

### 4.1 Methodology

We conducted a consumption analysis to estimate the electric energy savings. Our methodology compares pre- and post-participation energy usage, using future participants as a comparison group. This is called a Variation-in-Adoption method, and it is one of the recommended methods to use when it is not possible to do a randomized control test.<sup>8</sup> Since this is a three-year study, pre-participation usage for 2014 and 2015

<sup>7</sup> Participant telephone survey sample only included participants from 2014 and 2015 to help mitigate recall bias.

<sup>8</sup> SEE Action, "Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations", DOE/EE-0734, May 2012, p. 17.

participants serves as a comparison for 2013 participants. Likewise, pre-participation usage for 2015 participants serves as a comparison for 2014 participants. To get a comparison for 2015 participants, we include pre-participation usage for 2016 participants in the model.

We used comparison group matching to ensure that our comparison group was as similar as possible to participants. For each participant in 2013-2015, we compared their pre-participation monthly bills to the corresponding monthly bills for each possible comparison group match (using only pre-participation data for the control group client, also). We then took the difference in kWh usage for each matched monthly pair and squared it. We developed a score equal to the sum of squared differences across all available months of pre-participation data for each possible participant-comparison group match. Pairs with the lowest scores indicate the best comparison group match for each participant based on similar electric usage patterns and levels. We used these scores, in combination with other geographic data, to build and test different comparison group specifications within the modeling process.

After selecting the comparison group, we built a Conditional Savings Analysis (CSA) model to estimate weather-normalized, program-induced energy (kWh) savings based on differences in participant and comparison group data. We identified program-induced energy savings by combining participant tracking data with client consumption data to classify pre- and post-participation periods for each individual participant based on the month their measures were installed.

Next, we weather normalized the model by including variables that account for changing weather conditions from year to year. We used zip codes for each participant to locate the nearest National Oceanic and Atmospheric Administration (NOAA) weather station with consistently valid hourly data and identified five valid stations for Idaho clients.<sup>9</sup> We next converted the hourly data into the monthly Heating Degree Day<sup>10</sup> and Cooling Degree Day<sup>11</sup> data needed for analysis of monthly consumption. Last, we included a monthly index in the model to provide information on time trends that appear across all clients, both participants and comparison clients.

To automatically account for all unknowns that vary by client (such as square footage, etc.), we used the

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<sup>9</sup> The nearest NOAA weather station with reliable hourly data was found without paying attention to what state the weather station was located in. That means the nearest station for an Idaho client was not necessarily in Idaho. There were five weather stations matched to Idaho clients in this study:

Driggs-Reed Memorial Airport, Driggs, ID 83422  
Idaho Falls Regional Airport, Idaho Falls, ID 83402  
Pocatello Regional Airport, Pocatello, ID 83204  
Logan-Cache Airport, Logan, UT 84321  
Rexburg-Madison County Airport, Rexburg, ID 83440

For occasional occurrences of missing hourly data within a weather station series, we replaced the missing data with an average of temperatures from the other weather stations with reliable data. The data from the other stations is weighted based on 1/squared distance between the two stations. Consequently, a station twice as far away receives ¼ of the weight in the calculation of the average.

<sup>10</sup> Heating Degree Day = 65 - Daily Average Temperature; if HDD < 0 then HDD = 0. The HDD is calculated for each day, then summed over the month to get monthly HDD.

<sup>11</sup> Cooling Degree Day = Daily Average Temperature - 65; if CDD < 0 then CDD = 0. The CDD is calculated for each day, then summed over the month to get monthly CDD.

following fixed-effects regression model specification:

$$\begin{aligned}
 ADC_{kt} &= a_k \\
 &+ a_1 Month_t \\
 &+ a_2 HddD_t \\
 &+ a_3 CddD_t \\
 &+ a_4 Post_{kt}
 \end{aligned}$$

Where:

- $ADC_{kt}$  = Average Daily kWh Consumption of client k during month t
- $a_k$  = Fixed effect of client k
- $Month_t$  = Number of months since January 2012 for month t
- $HddD_t$  = Average Heating Degree Days per day during month t
- $CddD_t$  = Average Cooling Degree Days per day during month t
- $Post_{kt}$  = A 0/1 binary variable equal to 1 for client k in month t if their LIW measures have already been installed

### 4.1.1 Description of the Data

To begin our consumption analysis, we first prepared the data by matching Program participants to the available billing records. We did so as we felt it important to include billing records only if the same client was in the same premise for a sufficient amount of time during the study period. This is because many of the measures create savings related to space heating use, which can vary significantly depending on the comfort level preferred by the occupant. For example, if measures are installed in a home and a new occupant moves in shortly after who likes to keep their home warmer, measurement of the true energy savings from the measures would be obscured by behavior changes. Consequently, our consumption analysis only includes monthly billing records for clients who resided at the same premise for at least 11 months before and 11 months after the measures were installed. Due to the seasonal nature of savings related to space heat and cooling, we recognize the importance of including as much of a full year of data as possible for reporting average annual savings. These requirements left 135 participants in the analysis dataset, which is equal to approximately 80% of all clients who participated in 2013-2015. They are spread across participation years as shown in Table 6.

**Table 6. Participants with Valid Data for Consumption Analysis**

Year Measures Installed	Number of Participants
2012	57
2013	35
2014	43
2015	53
<b>Total</b>	<b>135</b>

After identifying program participants with sufficient valid consumption data, we next identified the best matched comparison client for each participant. Selecting the top three comparison group matches for each participant using lowest match scores is a good balance between getting a tight match and compensating for cases with a low number of pre-participation month matches. Note that the same comparison group client is often in the top three matches for more than one participant. Regardless of the number of matches, each

comparison group client is included in the model dataset only once.

Using the top three matches algorithm, we found 405 matches for the 135 participants. There are 150 unique clients within the group of 405 top three matches. Twenty of these comparison group clients are from the 2016 participant group. Consumption data used for analysis covers 2012 through 2016, to include both pre-participation data for 2013 participants and post-period comparison data for 2015 participants.

## 4.2 Results

We produced the results presented in Table 7 when we ran the model with 135 participants and the matched comparison group from the top three matches algorithm.

**Table 7. Results of the Consumption Analysis Model using Top Three Matched Control Group**

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	1	-0.0027	0.16104	-0.02	0.9866
Month	1	-0.04512	0.01631	-2.77	0.0057
HddD	1	1.35511	0.01344	100.85	<.0001
CddD	1	1.54213	0.1028	15	<.0001
Post	1	-3.24594	0.56812	-5.71	<.0001

As the parameter estimate on the *Post* variable indicates, we find an average savings of 3.25 kWh per day after Program measures are installed. This translates to 1,185 kWh of savings per year on a weather-normalized annual basis. All coefficients are statistically significant at the 95% confidence level or better and the adjusted R-squared for the model is 0.634.

We built alternative models to test the consistency of the savings estimate from the basic model. Based on the similarities in energy savings estimates across the model specifications, we feel confident in our annual per participant savings estimate of 1,185 kWh per year. Results from these models are in Appendix A.

### 4.2.1 Ex Post Net Energy Savings from the Program

As shown, the average annual net energy savings per participant for the 2013-2015 program years is estimated as 1,185 kWh. In Table 8, we present the annual ex-ante gross and ex-post net energy savings for the Program.<sup>12</sup> The net savings realization rate is 90% for the 2013-2015 evaluation period.

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<sup>12</sup> We retrieved ex-ante gross energy savings by year from Rocky Mountain Power’s Idaho Energy Efficiency and Peak Reduction Annual Reports for the years 2013 through 2015.

Table 8. Ex-Ante Gross and Ex Post Net Energy Savings (kWh)

Program Year	Participation	Ex-Ante Gross Energy Savings (kWh)	Ex-Post Net Energy Savings (kWh) <sup>13</sup>	Realization Rate
2013	74	101,771	87,690	86%
2014	41	52,320	48,585	93%
2015	53	68,016	62,805	92%
<b>Total</b>	<b>168</b>	<b>222,107</b>	<b>199,080</b>	<b>90%</b>

#### 4.2.2 Comparison to Previous Year's Savings Estimate

The net savings estimate per participant, 1,185 kWh, is approximately 55% of the previous evaluation period (2010 through 2012). Lower savings can result from a variety of factors such as the mix of measures installed, as well as characteristics of the clients who participated in the Program. Program tracking data shows that no furnaces were replaced during the 2013-2015 program years, but a total of 16 furnaces were replaced during the 2010-2012 program years. Another contributing factor is occupancy changes. Over one-quarter of survey respondents indicated that someone in the household retired or became unemployed since the measures were installed which may have increased the hours of use for heating and water heating which could then decrease energy savings.

#### 4.2.3 CFL Persistence

To get a sense of the persistence of CFLs installed through the Program, we inquired whether participants still had the bulbs installed. Forty percent (n=7 out of 17) stated that all of the CFL bulbs were still installed, which means that most program participants removed some or all of the CFL bulbs. Those who replaced bulbs noted a mix of bulb types used including incandescents and LEDs. The Program's decision to move from CFLs to LEDs will likely reduce the removal rate.

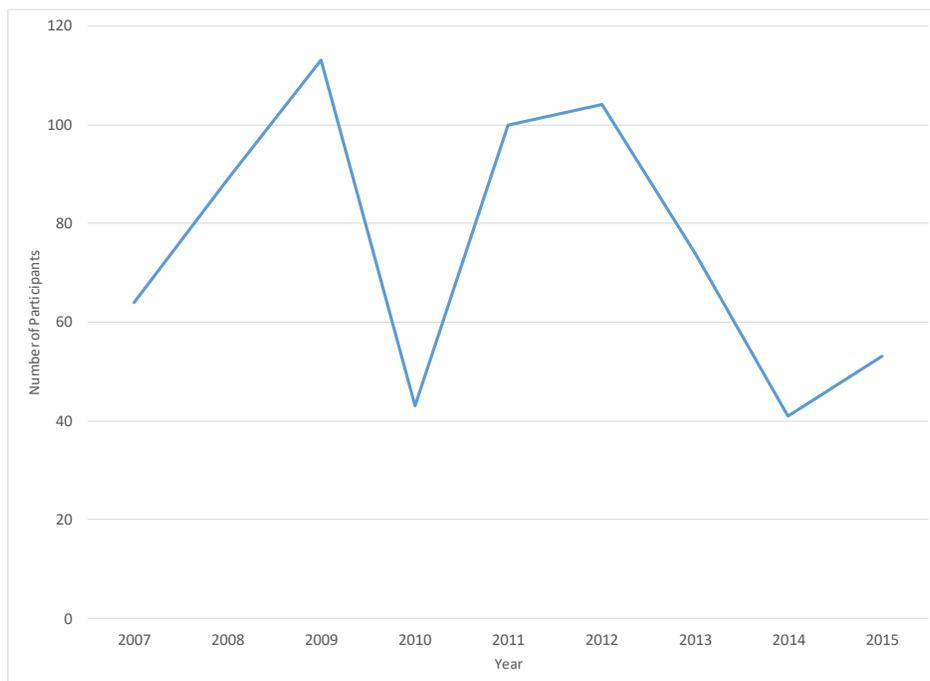
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<sup>13</sup> The annual ex post net energy savings estimate of 1,185 kWh per participant is multiplied by the number of participants to arrive at the yearly ex post net energy savings in the table.

## 5. Process Evaluation

Notably, the Program’s popularity has been declining since 2012 (see Figure 2). It is uncertain if the number of participants has reduced because it has become more difficult to serve clients in a timely manner, because ARRA funding is no longer available to help support weatherization efforts, or because fewer clients are signing up to participate in the program. Regardless, the number of participants served by the program during this evaluation period is far smaller than it has been in previous years. In this process evaluation, we examined the Program’s operations from the perspective of the agencies and participants.

**Figure 2. Number of LIWP Participants from 2007 - 2015**



### 5.1 Agency perspective

We conducted a total of two agency interviews in December 2016. One was with a representative from EICAP and the other included two staff members from SEICCA. These interviews were conducted to gain a deeper understanding of the Program’s operations and any key areas of improvement. We present each agency’s perspective in the subsections below. Notably, 75% of Program participants received EICAP Program services and 25% received SEICCA services.

#### 5.1.1 Eastern Idaho Community Action Partnership (EICAP)

EICAP serves a larger number of Rocky Mountain Power clients and successfully used all of its available Program funds. EICAP has additional state and federal funding sources available to implement weatherization services. Since Rocky Mountain Power covers 85% of program implementation costs, EICAP mostly uses USDOE funding to make up the remaining 15%.

To receive weatherization services from EICAP, residents complete an application, which is then reviewed by the agency. If an applicant is eligible, he or she is put on a waiting list. EICAP prioritizes households with young children or with elderly or disabled residents. The agency reviews the waiting list daily to re-prioritize applicants based on how long they have been waiting for services, as well as the ratio of heating cost to household income. It can take up to three years to receive weatherization services, though this wait list is not specific to Rocky Mountain Power applicants since EICAP implements weatherization programs for other agencies as well.

Once an applicant comes up on the waiting list, EICAP sends out a letter and waits to hear back from the applicant. If no one responds, EICAP sends out a second letter. The weatherization director noted that during the fall and winter, applicants tend to be quick to respond and engage in the process. This is reasonable given clients must feel the effect of the cold strongest during these times. The response back from applicants is not as strong in the spring and summer since they do not feel the immediate need for weatherization. Those who do not respond are moved to a second waiting list and will be contacted again later.

The EICAP staff was asked about barriers to participation and challenges operating the Program but did not think there were any saying the program is a “win-win situation”.

### 5.1.2 SouthEastern Idaho Community Action Agency (SEICAA)

Funding for SEICCA low income weatherization services comes from a variety of state and federal sources such as USDOE, USDHHS, LIHEAP, and IDHW, in addition to Rocky Mountain Power. Starting in 2015, the agency keeps records of the funding sources by program participant. Rocky Mountain Power funding seems to be sufficient to meet demand as SEICAA did not use all available Rocky Mountain Power funds. As such, SEICCA does not typically have an issue immediately serving Rocky Mountain Power clients who qualify. Clients who call from other utility service territories are put on a waiting list, which was estimated to include between 200 and 400 names in their seven-county service area. Though they have an extensive waiting list of clients from other service territories, SEICAA prioritizes households with young children, elderly or disabled residents, or homes without working heat or a working water heater.

Agency staff indicated that the Program is running smoothly from their perspective but noted the following challenges:

- One key challenge in operating weatherization program sponsored by several different funding sources, is that the agency must keep track of the variances by program. The programs do not offer the same measures and have different eligibility requirements.
- Clients sometimes are unsure of whether their heating source is electric. They may think they have electric heat, but when SEICAA visits they home they discover it does not qualify for the Program because it has non-electric heat. Sending out auditors to homes that are not eligible for the program leads to increased operating costs without commensurate benefits from energy savings through weatherization.
- Safety and structural issues in the home are barriers to program participation and contribute to program costs without energy saving benefits. If an auditor comes to a home and finds faulty wiring, excessive mold, lead paint, or sewer leaks that could be harmful to the health of crews who would weatherize the home, clients are asked to deal with these concerns before Program measures can be installed. Residents may not have the funds to address these issues or they may rent their homes from a homeowner who chooses not to address these issues. SEICAA staff said it would be nice if they could use program funds for roof repairs and sewer leaks. They do have access to crisis funding for plumbing

and minor leaks, but there is not enough funding available to cover large scale roof repairs and sewer leaks. As noted in Rocky Mountain Power’s Electric Service Schedule 21 which addresses the Low Income Weatherization Program, “reimbursements related to health and safety measures are limited to 15% of the annual cost of total jobs performed by the agency.” Some funding is therefore available, but not enough to cover large scale issues.

## 5.2 Participant perspective

The evaluation team attempted to reach a census of clients who participated in the Program in 2014 and 2015 with a telephone survey. Participants from 2013 were not included to avoid recall bias, given the amount of time that has passed since these participants received weatherization services through the Program. Of the 94 clients who participated in 2014-2015, we had valid phone numbers for 91. A total of 21 participants completed telephone interviews, yielding a response rate of 33% and cooperation rate of 75%.<sup>14</sup> (see Table 9).

**Table 9. Idaho Client Telephone Survey**

Population Frame	Unique Telephone Numbers	Final Survey Responses	Survey Response Rate	Survey Cooperation Rate
94	91	21	33%	75%

The call center attempted to reach participants multiple times. Table 10 lists the survey disposition categories.

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<sup>14</sup> Response rate is calculated using American Association for Public Opinion Research (AAPOR) Response Rate 3.

**Table 10. Participant Survey Disposition**

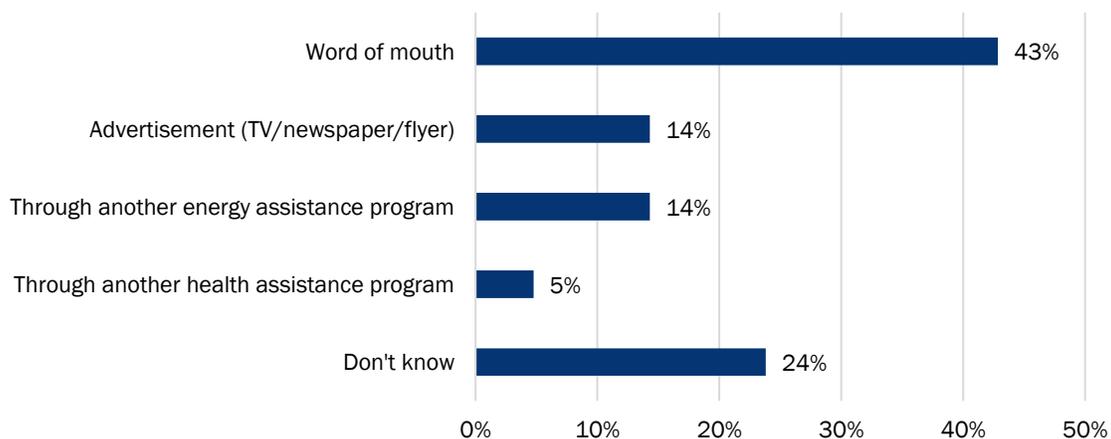
Survey Disposition	Sample
Completed	21
Disconnected phone	22
Not available callback	12
Answering machine	11
No answer	4
Not available	4
Hard Refusal - Do not call	4
Initial refusal	3
Client said wrong number	3
Language problems	2
Non-specific callback/secretary	2
Busy	1
Business/Residential phone	1
Computer tone	1
<b>Total</b>	<b>91</b>

We used this survey to collect data about participant household characteristics and Program experience. Based on demographic data provided by clients during the participant survey, approximately 62% (n=13) stated that they reside in single family or manufactured homes and one-third reported living in mobile homes (n=7). A total of 81% (n=17) own their homes with the remaining 19% renting their residences. Ninety percent of surveyed participants also self-reported that their homes were built before 1996.

### 5.2.1 Program Awareness

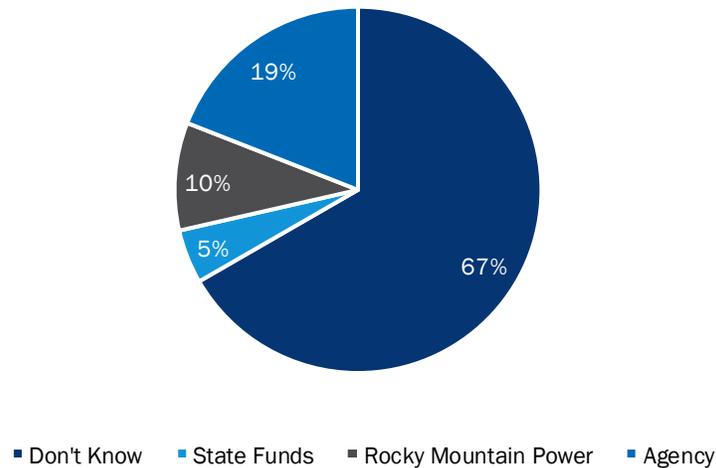
Participants were asked how they heard about the Program. Figure 3 shows that most participants heard about the program by word of mouth from family, friends, and neighbors (43%). Fourteen percent of participants learned about it through marketing through television, newspapers, and/or flyers.

**Figure 3. How Participants Learned of the Program (n=21)**



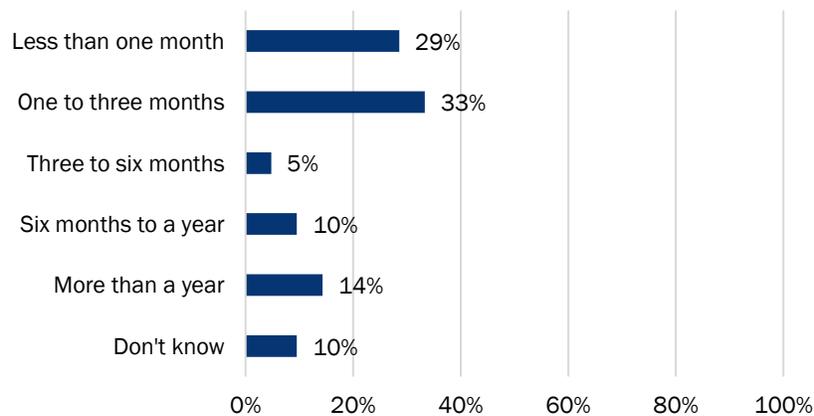
Most participants are not able to identify the funding source for the Program. As seen in Figure 4, participants who could identify a funding source often associated the Program with the agency not Rocky Mountain Power. The agency staff from SEICAA reported that implementation staff places a sign in the front yards of homes to acknowledge both SEICAA and Rocky Mountain Power are providing the weatherization services.

**Figure 4. Participant Awareness of Program Funding Sources (n=21)**



Most surveyed participants (62%) reported receiving weatherization services within three months of submitting their application.

**Figure 5. Time between Application Process to Receiving Weatherization Services (n=21)**



### 5.2.2 Energy Education

The Program does not offer energy education formally, however, Figure 6 shows 90% of survey respondents learned about ways to save energy from the agency staff, and many of them (78%, n=19) took some recommended energy saving actions (Figure 7). Even though the Program does not officially include energy education, the opportunity to present energy saving recommendations during audits or measure installations has had a positive impact on program participants.

Figure 6. Weatherization Staff Provided information on Ways to Save Energy in the Home (n=21)

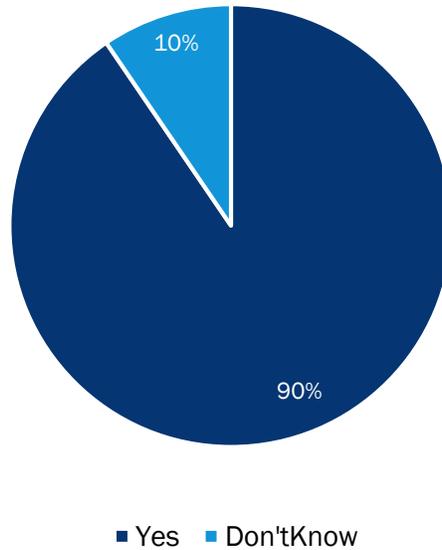
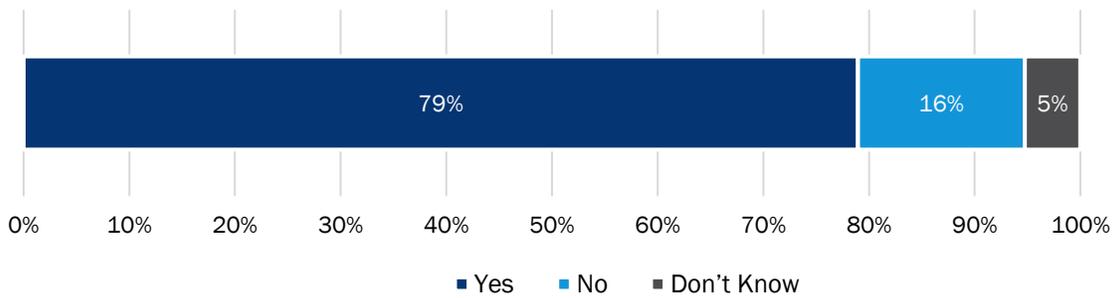
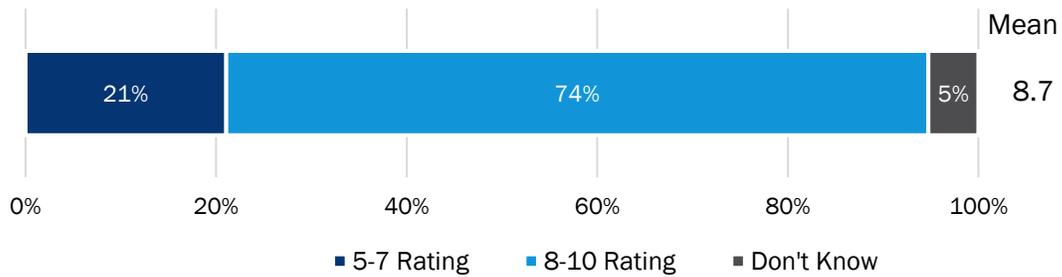


Figure 7. Participants Who Took Energy Saving Actions (n=19)



Participants provided positive feedback on the energy education received informally, as most participants indicated the energy education they received was “extremely helpful” (Figure 8).

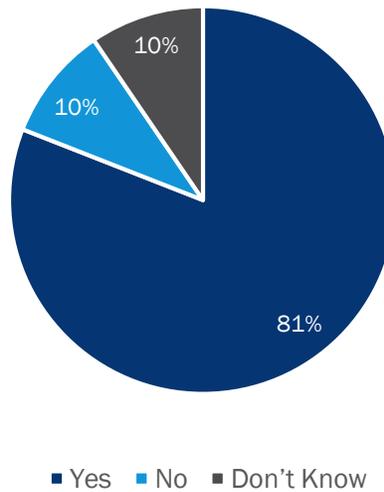
Figure 8. Helpfulness of Energy Education (n=21)



Scale from 0 to 10 where 0 is "Not at All Helpful" and 10 is "Extremely Helpful"

In addition to ways to save energy in the house, 81% of participants indicated the weatherization staff discussed ways to improve health and safety in the home (Figure 9).

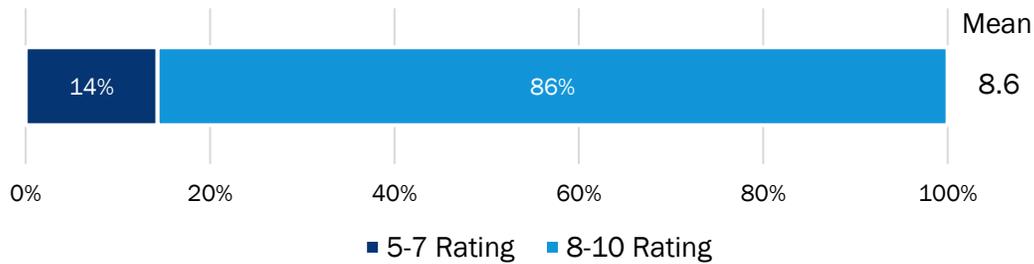
Figure 9. Ways to Improve Health and Safety in the Home (n=21)



### 5.2.3 Program Delivery and Satisfaction

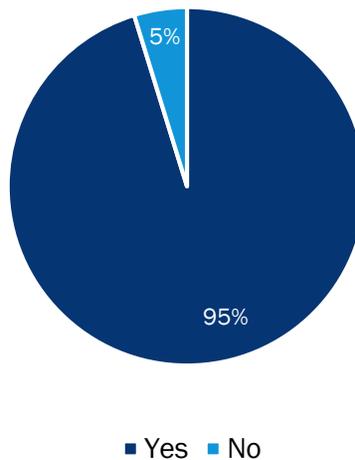
Participant feedback was highly positive as well. Most participants were "completely satisfied" with the Program, as seen in Figure 10. Further, 95% of participants said they would recommend it to others (Figure 11).

**Figure 10. Program Satisfaction (n=21)**



Scale from 0 to 10 where 0 is "Completely Dissatisfied" and 10 is "Completely Satisfied"

**Figure 11. Recommend Program to Family and Friends (n=21)**



Reflecting high Program satisfaction, a little over half of respondents had no suggestions for improving the Program. Amongst those who provided suggestions, participants most often requested more repairs in the home, better work quality or a quicker participation process. The table below includes the verbatim suggestions from survey respondents.

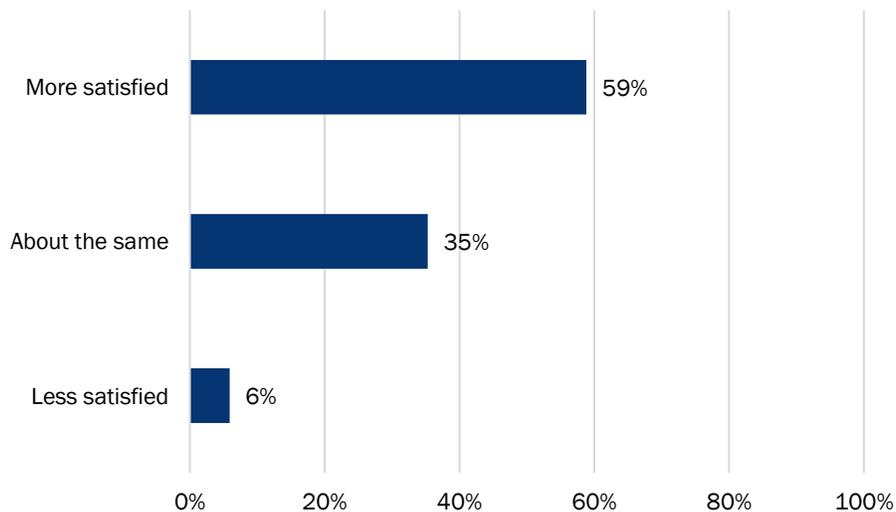
Participant Recommendations for Program Improvements
Follow through with work faster.
Speeding up approval process.
One fan leaked a little bit, several months after. Better understanding of what they did, looking back it's a very basic understanding. We weren't completely sure on what they were doing, and would be nice to be a little more informed.
Have better quality of materials to work with.
If they could get more money for the program, so they can provide more help for things such as bad heaters.
Weren't allowed to go under the motor home would like to have seen more repairs done to the bottom of the motor home.
Should have done all the windows.

Participants were pleased with the application process, with 75% stating the process was “Extremely Easy”. Further, all participants were very pleased with the weatherization staff, all stating “Yes” when asked if the agency staff was courteous and respectful towards participants and their family members and 86% agreed the work crew worked carefully to protect the home.

### 5.2.4 Impact of Program

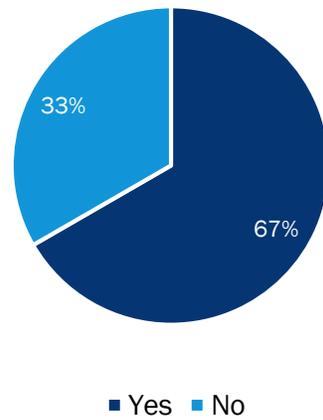
There were seventeen participants who recalled the weatherization staff installing CFL bulbs. Of those, 59% (n=10 out of 17) were more satisfied with the CFLs than their previous lighting and 35% stated the lighting quality was about the same (Figure 12). Understanding the lighting landscape in Idaho amongst low income clients helps to determine whether they have ceased purchases of incandescents due to EISA legislation and started to migrate to CFLs without the Program. If so, this would be an argument to stop providing CFLs or to switch to LEDs instead. Many participants reported they had CFLs prior to receiving the free bulbs (52%). Given this, the Program made a sound decision to switch from CFLs to LEDs in 2016.

Figure 12. Satisfaction with CFLs (n=17)



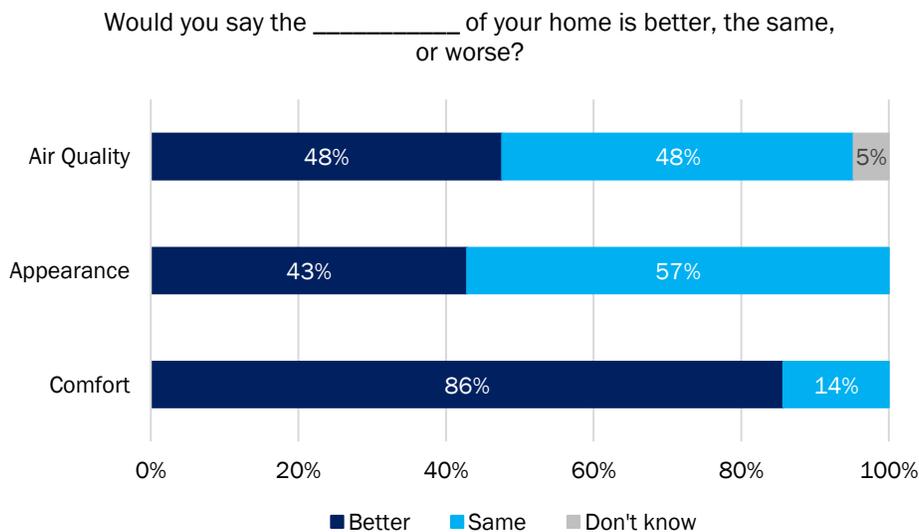
As seen in Figure 13, 67% of participants noticed a change in their electric bill and of those 52% (n=11 out of 14) said their bill was lower following the weatherization services.

Figure 13. Change Noticed in Electric Bill (n=21)



We also explore non-energy impacts. In the telephone survey, we asked Program participants if the air quality, appearance, and comfort were better, the same, or worse after they participated. As Figure 14 shows, comfort of the home improved the most, with 86% noting an improvement. Home appearance and air quality in the home were better for 43% and 48% of participants as well. This provides further evidence of the positive impact of the Program beyond energy saving benefits.

Figure 14. Impact of Measures on Home Characteristics (n=21)



## 6. Payment and Arrearage Analyses for Non-Energy Benefits

We completed payment and arrearage analyses to quantify some non-energy impacts of the Program. We compared changes to external assistance payments and customer arrearages between Program participants and a comparison group over the evaluation period. These cost savings serve as non-energy benefit inputs to calculate cost-effectiveness for the Program.

### 6.1 Methodology

In addition to the external payment data described in the Data Sources section (Section 3), additional data used in the analysis came from the Program tracking data. We merged the cost recovery date, which allowed us to determine the pre- and post- periods based on when the client received the energy efficient measures.<sup>15</sup> With these data, we calculated the difference external payments and customer arrearages made during pre- and post-periods between Program participants. We define the pre-period as the year prior to the cost recovery date and the post-period as the year after the cost recovery date. For the comparison group, we estimated the average cost recovery date for all participants and used it for every household in the comparison group.

Opinion Dynamics first reviewed the participant and comparison group external payment and arrearage data provided by Rocky Mountain Power. We next summarized the payment and arrearage data and the total number of billing days for the pre- and post-periods for each account from one year prior to participation through one year post-participation, based on the cost recovery date. We removed participant and comparison group sites from our analysis if we did not receive at least 12 months of external payment and arrearage data in the pre- or post-periods.

After applying the screening criterion, we were left with 121 participants and 48 comparison group clients out of the original counts of 168 participants and 50 comparison group clients for the payment analysis. For the arrearage analysis, we were left with 114 participants and 41 comparison group clients.

### 6.2 Results

Table 11 below presents the annual change in assistance payments annually and overall for the evaluation period. Assistance payments decreased by an average of over 40% for Program participants while it increased by over 60% for the comparison group. A net reduction in external payments of \$112 is the net benefit of the Program.

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<sup>15</sup> We intended to use the variable “measure effective date” but the program tracking data for participants in 2013 did not include this variable. To remain consistent in our treatment of participants we relied on the “cost recovery date”, which was available for all participants. The difference between the two date fields was, on average, less than one month, so we felt it would be close enough to the date that measures were installed in participants’ homes. Cost recovery date is used as a proxy for measure installation date throughout the payment analysis.

**Table 11. Payment Assistance Amounts Summary for Participants and Comparison Group**

Year	Participant Group				Comparison Group				Net Difference	Net Program Benefit
	Pre	Post	Change	% Change	Pre	Post	Change	% Change	Amount	
2013	\$ 229	\$ 128	\$ (101)	-44%	\$ 1,464	\$ 1,460	\$ (4)	0%	\$ 97	\$ 101
2014	\$ 278	\$ 128	\$ (149)	-54%	\$ 1,433	\$ 2,354	\$ 921	64%	\$ 1,071	\$ 149
2015	\$ 275	\$ 189	\$ (86)	-31%	\$ 2,245	\$ 4,976	\$ 2,731	122%	\$ 2,817	\$ 86
<b>Total</b>	<b>\$ 260</b>	<b>\$ 148</b>	<b>\$ (112)</b>	<b>-43%</b>	<b>\$1,714</b>	<b>\$2,930</b>	<b>\$1,216</b>	<b>62%</b>	<b>\$ 1,328</b>	<b>\$ 112</b>

In addition to a reduction in external assistance payments, we examined the change in arrearages. An arrearage is the unpaid ending monthly balance on a customer’s bill. To estimate this non-energy benefit, we calculated the change in arrearage payments for Program participants and compared this to the change in arrearage payments for the comparison group. Table 12 presents the findings from this analysis. The average monthly arrearage for the participant group decreased by \$5 while it increased by \$12 for the comparison group. The net difference is \$17, however similar to the payment analysis above, the net difference does not represent the non-energy benefit because the participant group nor the utility benefit from the increased arrearages paid to the comparison group. The net Program benefit is the \$5 reduction in monthly arrearages paid to the participants of the Program.

**Table 12. Arrearage Summary for Participant and Comparison Groups**

	Participant Group Arrearage				Comparison Group Arrearage				Net Difference	Net Program Benefit
	Pre	Post	Change	% Change	Pre	Post	Change	% Change	Amount	
Monthly Arrearage	\$ 38	\$ 33	\$ (5)	-14%	\$ 28	\$ 40	\$ 12	43%	\$ 17	\$ 5

## 7. Cost-Effectiveness

This section presents the cost-effectiveness findings for Navigant’s analysis of the Idaho Low Income Weatherization Program for program years 2013-2015. Navigant completed cost-effectiveness tests of the Program using various approaches: PacifiCorp Total Resource Cost (PTRC) test, Total Resource Cost (TRC) test, Utility Cost (UTC) test, Ratepayer Impact Measure (RIM) test, and the Participant Cost Test (PCT). Each scenario is analyzed using modeled assumptions provided by PacifiCorp.

All scenarios utilize the following assumptions:

- **Avoided Costs:** Navigant performed a custom analysis of calculating avoided costs by using the *Residential Whole House* decrement cost and the Residential Cooling load shape. The decrements values were populated using the 2013 PacifiCorp Integrated Resource Plan (IRP) for program years 2013-2014 and the 2015 PacifiCorp IRP for program year 2015.
- **Modeling Inputs:** Navigant utilized program level savings provided by Opinion Dynamics and administration costs provided by Rocky Mountain Power in the file *LIW Evaluation Cost-effectiveness Inputs V2.xlsx*.
- **Non-Energy Benefits (NEBs):** Navigant incorporated select NEBs including payment assistance and arrearages, which were provided by Opinion Dynamics. The direct cost of health and safety repairs is also included as a NEB and is quantified as a cost-offset to the program. Health and safety repair costs are provided by Rocky Mountain Power.
- **Benefit/Cost Tests:** Multiple benefit/cost tests are reported including; PacifiCorp Total Resource Cost Test (PTRC), Total Resource Cost Test (TRC), Utility Cost Test (UCT), Rate Impact Test (RIM), and Participant Cost Test (PCT).

The cost-effectiveness inputs are as follows:

**Table 13. Low Income Weatherization Program Inputs**

Parameter	2013	2014	2015
Discount Rate	6.88%	6.88%	6.66%
Residential Line Loss	11.47%	11.47%	11.47%
Residential Energy Rate (\$/kWh)	\$0.10620	\$0.10490	\$0.10480
Inflation Rate <sup>1</sup>	1.90%	1.90%	1.90%

<sup>1</sup> Future rates determined using a 1.9% annual escalator.

**Table 14. Low Income Weatherization Program Annual Program Costs**

Program Year	Utility Admin	Admin Program Delivery	Eval, Marketing, Prog Devel.	Incentives	Total Utility Costs	Gross Customer Costs
2013	\$20,847	\$17,866	\$361	\$164,667	\$203,741	\$0
2014	\$16,455	\$13,260	\$1,688	\$150,694	\$182,097	\$0
2015	\$20,502	\$16,697	\$3,099	\$215,356	\$255,653	\$0
2013-2015	\$57,803	\$47,823	\$5,148	\$530,717	\$641,491	\$0

**Table 15. Low Income Weatherization Program Annual Program Savings**

Program Year	Gross kWh Savings	Realization Rate	Adjusted Gross kWh Savings	Net to Gross Ratio	Net kWh Savings	Measure Life
2013	101,771	86%	87,690	100%	87,690	25
2014	52,320	93%	48,585	100%	48,585	25
2015	68,016	92%	62,805	100%	62,805	25
2013-2015	222,107	90%	199,080	100%	199,080	25

**Table 16. Low Income Weatherization Program Non-Energy Benefits**

Program Year	Payment Assistance	Arrearage	Health and Safety	Total Non-Energy Benefits
2013	\$98,295	\$15,442	\$28,760	<b>\$142,496</b>
2014	\$54,461	\$8,555	\$31,575	<b>\$94,591</b>
2015	\$70,400	\$11,060	\$23,297	<b>\$104,756</b>
2013-2015	\$223,155	\$35,057	\$83,632	<b>\$341,843</b>

**Table 17. Non-Energy Benefit Adjustments**

Non-Energy Benefit	Perspective Adjusted
Payment Assistance	PTRC, TRC
Arrearage	PTRC, TRC, UCT, RIM
Health and Safety	PTRC, TRC

The benefit/cost ratios for each of the cost-effectiveness tests are presented in Table 19.

**Table 18. Benefit/Cost Ratios - Low Income Weatherization**

Program Year	PTRC	TRC	UCT	RIM	PCT
2013	1.23	1.17	0.63	0.4	n/a
2014	1.24	1.18	0.64	0.4	n/a
2015	1.22	1.17	0.63	0.4	n/a
<b>2013-2015</b>	<b>1.23</b>	<b>1.17</b>	<b>0.63</b>	<b>0.4</b>	<b>n/a</b>

Table 19 provides the cost-effectiveness results for the combination of program years 2013 through 2015.

**Table 19. LIW Program Level Cost-Effectiveness Results – PY2013-2015**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.20	\$1,702,926	\$2,095,326	\$392,401	1.23
Total Resource Cost Test (TRC) No Adder	\$0.20	\$1,702,926	\$1,998,072	\$295,147	1.17
Utility Cost Test (UCT)	\$0.20	\$1,702,926	\$1,077,711	(\$625,214)	0.63
Rate Impact Test (RIM)		\$2,681,579	\$1,077,711	(\$1,603,867)	0.4
Participant Cost Test (PCT)		\$0	\$2,570,805	\$2,570,805	n/a
Lifecycle Revenue Impacts (\$/kWh)	\$0.00				\$0.0000185833
Discounted Participant Payback (years)	n/a				n/a

Table 20, Table 21, and Table 22 provide the cost-effectiveness results for each individual program year.

**Table 20. LIW Program Level Cost-Effectiveness Results – PY2013**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.20	\$569,791	\$698,442	\$128,651	1.23
Total Resource Cost Test (TRC) No Adder	\$0.20	\$569,791	\$666,024	\$96,233	1.17
Utility Cost Test (UCT)	\$0.20	\$569,791	\$359,237	(\$210,554)	0.63
Rate Impact Test (RIM)		\$896,009	\$359,237	(\$536,772)	0.4
Participant Cost Test (PCT)		\$0	\$856,935	\$856,935	n/a
Lifecycle Revenue Impacts (\$/kWh)	\$0.00				\$0.0000062497
Discounted Participant Payback (years)	n/a				

**Table 21. LIW Program Level Cost-Effectiveness Results – PY2014**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.20	\$562,120	\$698,442	\$136,323	1.24
Total Resource Cost Test (TRC) No Adder	\$0.20	\$562,120	\$666,024	\$103,905	1.18
Utility Cost Test (UCT)	\$0.20	\$562,120	\$359,237	(\$202,882)	0.64
Rate Impact Test (RIM)		\$888,337	\$359,237	(\$529,100)	0.4
Participant Cost Test (PCT)		\$0	\$856,935	\$856,935	n/a
Lifecycle Revenue Impacts (\$/kWh)	\$0.00				\$0.0000061251
Discounted Participant Payback (years)	n/a				

**Table 22. LIW Program Level Cost-Effectiveness Results – PY2015**

Cost-Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource Cost Test (PTRC) + Conservation Adder	\$0.20	\$571,015	\$698,442	\$127,427	1.22
Total Resource Cost Test (TRC) No Adder	\$0.20	\$571,015	\$666,024	\$95,009	1.17
Utility Cost Test (UCT)	\$0.20	\$571,015	\$359,237	(\$211,778)	0.63
Rate Impact Test (RIM)		\$897,233	\$359,237	(\$537,996)	0.4
Participant Cost Test (PCT)		\$0	\$856,935	\$856,935	n/a
Lifecycle Revenue Impacts (\$/kWh)	\$0.00				\$0.0000061927
Discounted Participant Payback (years)	n/a				

## 8. Conclusions and Recommendations

Rocky Mountain Power is adhering to best practices by delivering the program through community-based agencies. SEICAA and EICAP have served as Program implementers on behalf of Rocky Mountain Power for years. It is a common practice for utilities to work with community action agencies to bring their energy efficiency programs to low income households since these organizations generally have well-established relationships with them already. Additionally, these agencies are knowledgeable about using funding from utilities in combination with government funding to expand the reach of programs. SEICAA and EICAP both demonstrate their understanding of program processes, requirements and funding mechanisms. Leveraging these type of agencies is a best practice in low income weatherization programs. **Rocky Mountain Power should continue to use the same Program implementers moving forward.**

SEICAA and EICAP are consistent in their delivery and are adhering to federal guidelines and best practices to ensure cost-effective delivery; both mentioned using EA5, a USDOE approved software package to conduct audits. Both agencies also mentioned that as part of the audit, they input 12 months of energy usage data to arrive at a more accurate estimate of energy savings when they model the installation of energy measures. This had not always been a standard practice and came about during this most recent evaluation cycle. Auditors recommend measures based on USDOE Weatherization Assistance Program guidelines for installation which requires a Savings-to-Investment ratio of 1.0 or greater, when funds from the government or Rocky Mountain Power are used.

Participants continue to be highly satisfied with the Program, the application process and agency staff. The Program is giving energy conservation education that allows it to go beyond measure savings with behavior savings as well. Most participants recall this education, find it extremely helpful and many took some of the recommended actions. This education may be contributing to the strong net savings per participant.

Rocky Mountain Power has tried to increase awareness about its funding of the program, given that the utility provides 85% of the costs of measures installed in participants' homes. Most participants cannot recall who funds the Program and those that do often associate it with the agencies instead of the utility. Only 10% of surveyed clients identified Rocky Mountain Power as the funding source. In 2015, Rocky Mountain Power started to send letters and magnets to participants to thank clients for participating and to increase awareness of the utilities' role in the program. **These efforts may help increase association of the Program with Rocky Mountain Power over time but the Program may also consider branding the agency staff who conduct the audits and installation services by wearing shirts with the Rocky Mountain Power name and logo.**

Long waiting lists to receive weatherization services continue from one agency's perspective, although that agency could not decipher the Rocky Mountain Power waiting list versus other utilities. It may not be a huge issue for Rocky Mountain Power clients given that 62% of survey respondents said the Program served them within 3 months of applying. SEICAA noted that it served all Rocky Mountain Power clients that qualified and still had remaining funds. The demand for services may be higher than what Rocky Mountain Power can provide, particularly for EICAP. **However, since EICAP exhausted their Program funding and SEICAA did not use all of its funding, Rocky Mountain Power may revisit the funding levels to each agency and consider giving more to EICAP and less to SEICAA.**

Based on the consumption analysis, the net energy savings (1,185 kWh per participant) and realization rate (90%) for the program are very strong. The savings per participant is 55% of what was reported in the previous evaluation period (2010 through 2012). We believe this lower estimate stems from a difference in the measure mix installed in low income homes. No furnaces were replaced during the 2013-2015 program years, but a total of 16 furnaces were replaced during the 2010-2012 Program years. The savings will likely be persistent for many years as most participants (81%) are homeowners and the measures installed have long

effective useful lives, such as insulation. In addition, the Program is inducing non-energy benefits as well, including reducing bills, reducing the need for external payments, and increasing the comfort, safety and aesthetics of the home.

The Evaluation Team supports the Program's decision to switch from CFLs to LEDs in 2016. With EISA legislation, CFLs are slowly becoming the norm, half of the participants already had CFLs in their homes prior to participation and this is likely impacting the savings as some of these bulbs may not have replaced incandescents.

Though the Program has been well received, it has had declining participation since 2012. The decline in participation could be due to several factors, including market penetration amongst the eligible population or the depletion of ARRA funding. **We recommend that Rocky Mountain Power take a historical look at participation amongst its low income population that likely has electric heat to determine how much of the market has been penetrated thus far. This exercise could also help to identify and target households that have not participated yet.**

The Program could reduce costs if agencies can verify that a client has electric heat before visiting the home. Clients have difficulty with correctly identifying whether their home uses electric heating. Currently, the agencies rely on clients to tell them if they have electric heat and then verify it by visiting the home. **We recommend that Rocky Mountain Power coordinate the transfer of electric usage data to the agencies to help them determine if a client has electric heat before visiting the home. The average electric consumption for low income households with electric heat could help agencies determine if a client is in the general ballpark before visiting the home.**

Finally, the Program is struggling with an issue commonly found in low income weatherization programs throughout the country, i.e., overcoming the structural barriers to installing weatherization measures. These structural barriers are an issue impeding participation and cost-effectiveness. This issue is a quandary to most utilities who need to allocate funds directly to energy saving improvements, for cost-effectiveness standards, instead of structural and safety improvements that do not directly lead to energy savings. While other funding sources can help, it often is not enough. For most utilities, this remains an unsolvable dilemma. However, one electric cooperative in Arkansas advocated for a new tariff in the state that allowed for an innovative financing solution that directly solved this issue. The Pay-As-You-Save model, allows the utility to fund both structural and energy improvements and provides immediate net savings for the client. The client does not incur a debt obligation while the utility benefits from a low risk path to cost recovery through a charge on the bill that is less than the estimated savings from the upgrades. **We recommend that Rocky Mountain Power staff explore this innovating financing tariff that allowed a utility to address both structural and energy improvements through its low income weatherization program at no up-front cost to the client.** More information on this innovate tariff and how the program operates can be found in Appendix B.

## Appendix A: Alternative Model Specifications

We built alternative models to test the consistency of the savings estimate from the basic model. We built our first set of alternative models to look at the impact of using different algorithms for selecting the matched comparison group. Comparison Group Alternative 1 took the one best match for each participant rather than the top three matches. Comparison Group Alternative 2 continued to use the top three matches, but only selected the match if the weather station area was the same for both the participant and the match. We show very little variation in estimated savings using these alternative comparison groups, so we have confidence in the results developed using the base model. We show very little variation in estimated savings using the alternative models, as shown in Table 23.

**Table 23. Model Results for Different Comparison Group Specifications**

Model	Post Variable Coefficient	Annual KWH Savings
Basic Model	-3.24594	1,185
Control Group Alternative 1	-3.23580	1,181
Control Group Alternative 2	-3.26272	1,191

We built another set of alternative models to explore the impact of weather on the model results. While we did weather-normalize the basic model by including HDD and CDD factors, our review of the data shows that there was a significant difference in weather conditions between the pre- and the post- periods during the study timeframe. We demonstrate this by calculating the percentage differences in the pre- and post-period average annual heating and cooling degree days, as Table 24 shows.

**Table 24. Difference in Weather Temperatures in Pre- and Post- Period**

Model	Pre- Period	Post- Period	Percent Difference
Average Annual HDD	7,563	6,647	-12%
Average Annual CDD	420	387	-8%

It is possible that the warmer winters and cooler summers that occurred after installation of measures is affecting the impact estimates beyond what the basic weather-normalization model can account for.

Another indication that this may be an issue is the fact that the coefficient on the MonthIndex variable in the basic model is negative, indicating a small, continuous decrease in usage across all clients during the study time frame. We find this unusual because the coefficient on the time series variable is often positive in other consumption analyses, reflecting the fact that there is a small increase in usage over time across all clients as they add electric end uses into their lifestyle. We believe it is possible that the MonthIndex variable is picking up some of the decrease in usage that is actually a result of the milder weather that occurred in the later years of the study.

We tested four alternative models to see if they could do a better job of identifying Program-induced savings during this time of increasing mildness in the weather. We present the results of each of these alternative models in Table 25 below.

We added separate variables related specifically to HDD and CDD conditions during the post period in the Weather Alternative 1 model. By doing so, we theoretically created weather-normalized savings estimates based on the weather that occurred during the post period. Our results show that participants increased their summer usage (presumably air-conditioning) rather than decreased it in the post period. This increased

summer usage which offset the savings seen in the winter and in year-round base usage, creating an overall annual savings estimate similar to the basic model results. However, this increase in summer usage does not make much sense. It is possible that participants started using air-conditioning more after their homes were weatherized because it became more affordable, but this is unlikely given the fact that the summers were comparably much milder in the post period.

**Table 25. Comparison of Model Results for Different Weather Specifications**

Model	AIC	Month Variable Coefficient	Base Annual kWh Savings (Based on Post Coefficient)	HDD Annual kWh Savings (Based on Post*HDD Coefficient)	CDD Annual kWh Savings (Based on Post*CDD Coefficient)	Annual KWH Savings
Basic Model	46,405	-0.04512				1,185
Weather Alternative 1	46,368	-0.04899	834	564	(238)	1,159
Weather Alternative 2	46,375		1,355	537	(241)	1,631
Weather Alternative 3	46,374	-0.04952	277	911	0	1,188
Weather Alternative 4	46,603	-0.06474	482	772	0	1,254

In the Weather Alternative 2 model, we keep the new Post\*HDD and Post\*CDD variables, but remove the Month variable to test if Month is actually reflecting program-induced savings. Our results show that the decreasing usage the Month variable picked up in the Weather Alternative 1 model gets shifted to the post variables, creating an Annual kWh savings estimate of 1,631 kWh per client per year, which is much higher than the 1,185 kWh of savings from the Basic Model. However, this new model specification changes very little in the estimate of savings that come from space heat or cooling. It all goes to base usage. Since it is hard to justify why this program would impact base usage instead of space heat or cooling usage, and the Month coefficient is statistically significant for the combination of all pre- and post- and participant and comparison group observations, we hypothesize that the Month variable is truly picking up a non-Program-related trend and therefore should be retained in the model.

In the Weather Alternative 3 model, we put back the MonthIndex but drop Post\*CDD since it has a coefficient with the wrong sign. We see savings estimates very similar to the basic model, indicating that the influence of the CDD coefficient is not really a significant factor in the overall estimate of program savings.

Weather Alternative 4 goes one step further and keeps MonthIndex but drops both CDD and Post\*CDD to check if the CDD effect has any influence on the weather-normalization of the model at all because this area has such low air-conditioning need. We see a small increase in annual Program savings because there is no accounting for the fact that milder weather in the post period created some reduction in usage outside of the program.

While the negative coefficient on the MonthIndex variable is still a bit perplexing, none of the alternatives did a better job of accounting for milder weather in the post period. We therefore recommend that the basic model be kept as the best estimate of program-induced savings for the Program. This is true even though the AIC is slightly lower for some of the alternative weather models. We feel the greater transparency and ease of use related to the simplest Basic Model is more useful than the complications that occur from alternative models. We also see very little difference in results from selecting the simplest model.

# Appendix B: Alternative Financing Documentation

## Arkansas Pay as You Save Tariff

APSC FILED Time: 12/10/2015 1:57:24 PM: Recvd 12/10/2015 1:56:15 PM: Docket 15-106-TF-Doc. 4

<b>ARKANSAS PUBLIC SERVICE COMMISSION</b>	
Original	Sheet No. 28.4
Replacing	n/a Sheet No.
<b>Ouachita Electric Cooperative Corporation</b>	
Name of Company	
Kind of Service: Electric	Class of Service: As Applicable
<b>Part III. Rate Schedule No. 15</b>	
Title: <b>PAY AS YOU SAVE® (PAYS®) ON-BILL PROGRAM</b>	
PSC File Mark Only	

**15.0 PAY AS YOU SAVE® ON-BILL PROGRAM (The Program)**

**15.1 Eligibility:** Eligible on an optional and voluntary basis to any existing cooperative residential or small commercial member, or to the building owner of any structure occupied by an existing cooperative rental member, for energy efficiency improvements (Upgrades) where the cooperative provides electric service to the structure. It shall not be a requirement that the structure be all electric.

**15.2 Participation:** To participate in the Program, a member must: 1) request from the cooperative an analysis of cost effective upgrades, 2) agree to pay \$100 for the analysis at the time the member decides whether to implement recommended projects, and 3) review the Energy Efficiency Purchase Agreement described in 15.2.3, and implement any project that does not require an upfront payment from the member.

**15.2.1 Energy Efficiency Plans:** The cooperative will have its Program Operator or approved energy efficiency contractor perform a cost effectiveness analysis and prepare an Energy Efficiency Plan (The Plan), identifying recommended measures to improve energy efficiency and lower power costs. The cooperative may make an incentive payment for program participation that is less than the value of the Upgrades to the cooperative. Recommended Upgrades shall be limited to those where the annual Program Charges, including program fees and the cooperative's cost for capital are no greater than 80% of the estimated annual benefit from reduction to members' annual utility charges based on current rates in electricity and/or gas costs. In order to qualify a project for the Program that is not cost effective, Members may agree to pay the portion of a project's cost that prevents it from qualifying for the program as an upfront payment to the contractor. The cooperative will assume no responsibility for such upfront payments to the contractor.

**15.2.2 Cost Effectiveness Analysis Fee:** If the member proceeds with implementing the Energy Efficiency Plan resulting from the cost effectiveness analysis, the fee for the analysis will be included in the Program Charge, unless the fee prevents any project from qualifying for the program. Where the recommended measures and the full cost of the cost effectiveness analysis prevents any project from qualifying for the Program as per 15.2.3, the portion of the cost effectiveness analysis fee preventing a project from qualifying for the Program shall be waived. If there is no project that will qualify for the Program as described above without an upfront payment from the member and waiving a portion of the fee, the cost effectiveness analysis fee will be waived. The fee will not be waived if there is a project at a location that qualifies for the program and the

Ark. Public Serv. Comm. ---APPROVED---02/08/2016 Docket: 15-106-TF Order No. - 2

APSC FILED Time: 12/10/2015 1:57:24 PM: Recvd 12/10/2015 1:56:15 PM: Docket 15-106-TF-Doc. 4

<b>ARKANSAS PUBLIC SERVICE COMMISSION</b>	
Original	Sheet No. <u>28.5</u>
Replacing <u>n/a</u>	Sheet No. _____
<b>Ouachita Electric Cooperative Corporation</b>	
Name of Company	
Kind of Service: <u>Electric</u>	Class of Service: <u>As Applicable</u>
<b>Part III. Rate Schedule No. <u>15</u></b>	
Title:	<b>PAY AS YOU SAVE® (PAYS®) ON-BILL PROGRAM</b>
PSC File Mark Only	

member wants additional upgrades and agrees to pay the portion of the larger project's cost that prevents it from qualifying for the program as an upfront payment to the contractor. If the Energy Efficiency Plan identifies cost effective upgrades and the member declines to proceed, the member will pay \$100.

- 15.2.3 **Program Charge:** The cooperative will recover the costs for its investments through a monthly Program Charge assigned to the meter at the location where Upgrades are installed and paid by members occupying that location until all cooperative costs have been recovered. Program Charges will also be set for a duration not to exceed 80% of estimated life of the Upgrades or the length of a full parts and labor warranty, whichever is less. The Program Charge and duration of payments will be included in the Energy Efficiency Purchase Agreement. The maximum size of project considered for investment shall be \$25,000. The minimum size of project investment eligible for the Program shall be \$1,000.
- 15.2.4 **Approved Contractor:** Should the member determine to proceed with implementing The Plan, the cooperative shall determine the appropriate monthly Program Charge as described above. The member shall sign the Agreement and select a contractor from the cooperative's list of approved contractors.
- 15.3 **Quality Assurance:** When the energy efficiency measures are completed, the contractor shall be paid by the cooperative, following on-site or telephone inspection and approval of the installation by the cooperative or its Program Operator.
- 15.4 **Cost Recovery:** 45 days after approval by the cooperative or its Program Operator, the member shall be billed the monthly Program Charge as determined by the cooperative.
- 15.4.1 **Once the cooperative's costs for Upgrades at a location have been recovered, the monthly Program Charge shall no longer be billed, except as described in 15.7.**
- 15.4.2 As described in 15.6 or for any other reason if the monthly Program Charge is reduced or suspended, once repairs have been successfully effected or service reconnected, the number of total monthly payments shall be extended until the program charges collected equal the cooperative's cost for installation as described in 15.5. The duration of charges will also be extended if there are missed payments and the current occupant is still benefiting from the Upgrades in order for the cooperative to recover its costs to install Upgrades at a location.

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<b>ARKANSAS PUBLIC SERVICE COMMISSION</b>	
Original	Sheet No. 28.6
Replacing	n/a Sheet No.
<b>Ouachita Electric Cooperative Corporation</b>	
Name of Company	
Kind of Service: Electric	Class of Service: As Applicable
<b>Part III. Rate Schedule No. 15</b>	
Title: <b>PAY AS YOU SAVE® (PAYS®) ON-BILL PROGRAM</b>	
PSC File Mark Only	

- 15.5 **Tied to the Meter:** Until cost recovery for Upgrades at a location is complete or the Upgrades fail as described in 15.7, the terms of this tariff shall be binding on the metered structure and any future member who shall receive service at that location.
- 15.6 **Disconnection for Non-Payment:** Without regard to any other Commission or cooperative rules or policies, the Program Charge shall be considered as an essential part of the customer's bill for electric service, and the cooperative may disconnect the metered structure for non-payment of the Program Charge under the same provisions as for any other electric service.
- 15.7 **Repairs:** Should, at any future time during the billing of Program Charges the cooperative determine that the installed Upgrades are no longer functioning as intended and that the occupant, or building owner if different, did not damage or fail to maintain the Upgrades in place, the cooperative shall reduce or suspend the Program Charges until such time as the cooperative and/or its contractor can repair the measure. If the Upgrade cannot be repaired or replaced cost effectively, the cooperative will waive remaining charges. If the cooperative determines the occupant, or building owner if different, did damage or fail to maintain the Upgrades in place, it will seek to recover all costs associated with the installation, including any fees, incentives paid to lower project costs, and legal fees. The Program Charges will continue until cost recovery is complete.

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Ouachita Electric HELP PAYS Program

November 2016

# Opening Opportunities with Inclusive Financing for Energy Efficiency:

Preliminary Results of the Ouachita Electric HELP PAYS<sup>®</sup> Program



## Making a Best Practice Program Even Better

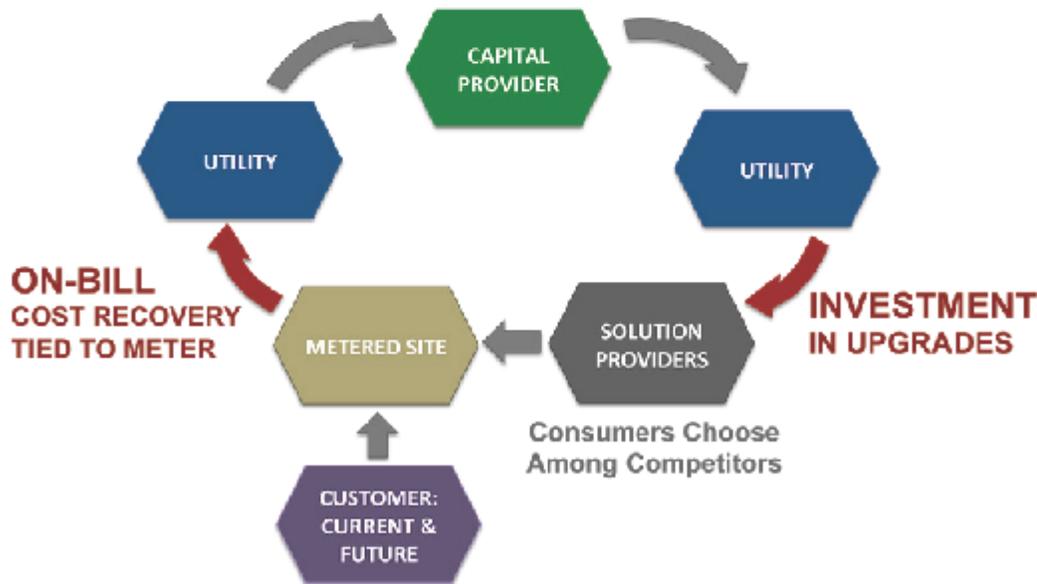
Earlier this year, the Arkansas Public Service Commission voted unanimously to approve our opt-in tariff for cost effective energy efficiency investments at the request of Ouachita Electric Cooperative.<sup>1</sup> Within 90 days, our utility switched from offering loans for energy efficiency upgrades (our HELP program) to offering inclusive financing through HELP PAYS®, a tariffed on-bill program based on the Pay As You Save® (PAYS®) system.



Mark Cayce, General Manager  
Ouachita Electric Cooperative

With HELP PAYS, our utility can serve all customers, regardless of income, credit score, and renter status. The tariffed terms provide immediate net savings for the customer with no new debt obligation, and it assures the utility a low risk path to cost recovery through a charge on the bill that is less than the estimated savings from the upgrades. Our utility assures the upgrades continue to function throughout the period of cost recovery, and once cost recovery is complete, all upgrades belong to the owner.

PAYS offers all utility customers the option to access cost effective energy upgrades using a proven investment and cost recovery model that benefits both the customer and utility.



*Pay As You Save® and PAYS® are registered trademarks of Energy Efficiency Institute, Inc.*

<sup>1</sup> Commissions in Kansas, Kentucky, Hawaii, and New Hampshire along with utility oversight boards in California and North Carolina have approved similar tariffs also based on the Pay As You Save® (PAYS®) system.

## Key Findings: HELP PAYS® Inclusive Financing vs. HELP Loan

Ouachita Electric Cooperative transitioned from its previous, nationally recognized HELP loan program to its HELP PAYS® tariffed on-bill investment program in order to benefit more of its members, and to increase the benefits it could deliver to participants. With this preliminary analysis of data for the first four months of the program, some of those benefits are being validated immediately by the market response compared to the same four months of the prior year with the HELP program in Ouachita Electric Cooperative's service area.

### 1. Increased Participation:

During the period April 1, 2015 – July 31, 2015, the HELP program in the same utility's service area served 46 members, all owners of single family homes. Over the same period during 2016, HELP PAYS® served 69 single family homes, 62 units of multifamily housing, and two commercial customers – approximately triple the number of participants.

### 2. Immediate Net Savings:

All HELP PAYS® participants benefit from immediate positive cash flow by keeping at least 20% of the estimated savings – compared to an average of zero immediate net savings in HELP, a bill neutral loan program.

### 3. Renters:

In the HELP PAYS® program, renters accounted for nearly half of the participants in its first quarter, customers who were ineligible to participate in the HELP loan program. Their landlords readily supported the program, agreeing to pay copayments required to qualify upgrades if needed. 100% of the renters accepted the offers they received by opting into the tariff.

### 4. Average investment:

In the same period during 2015, the average size of the 46 single family HELP loan project was near \$2,500. In the same period, the average investment through the HELP PAYS® program more than doubled.

### 5. Scale of total investment:

During the same period in 2015, the HELP loan program in the utility's service area produced investments in energy efficiency of \$116,538. With the HELP PAYS program, investment surged by more than a factor of 10 to exceed \$1.5 million.

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## Ouachita Electric HELP PAYS® Program

### Summary of Investment Activity

April 1 – July 31, 2016

#### Executive Summary

Ouachita Electric worked with its program operator, EUtility, to field interest in program participation from 149 customers, all of whom are member-owners of the cooperative. Ouachita Electric serves areas of persistent poverty in southern Arkansas, yet the design of this program does not depend upon income verification of participants. Through the HELP PAYS® investment program, Ouachita Electric was able to finance upgrades in multi-family housing for the first time, and renters accounted for nearly half of the participants.

EUtility identified investment opportunities in 93% of the sites, and 95% of those customers accepted the offer of investment, including the 24% of those customers for whom the investment was conditional on a copayment. Among the renters in multi-family housing, 100% of those receiving HELP PAYS® offers accepted the investment on the terms of the opt-in tariff, and the landlords agreed to pay for 100% of the copayments associated with those units where copays were required.

The total investment exceeded \$1.5 million in the first four months of the program, and the cost of capital applied by the utility was 4.5%. Two commercial projects (at a municipal building and a college campus) accounted for one third of the portfolio, and the rest was split between single family and multi-family residential. The average investment in efficiency upgrades to participating single-family housing was \$6,387, and the average for multi-family housing units was \$6,023.

Ouachita Electric serves an area where many people are living in homes built nearly 50 years ago that have not been previously upgraded for energy efficiency. This housing stock includes very energy inefficient homes or apartments. The estimated average annual energy savings are based on engineering calculations informed by direct site measurements and calibrated for each site with historical bill data. For single family upgrades, the estimated annual energy savings was above 30% and for multi-family housing, the average was more than 35%.

HELP PAYS® assures cost recovery for the utility through a fixed charge on a participant's bill called a Program Service Charge, which is capped at 80% of the estimated savings within 80% of the useful life of the upgrades, assuming no escalation in rates. As a result, the portion of the estimated monthly net savings that a participant keeps as immediate net savings is 20% or higher, and the HELP PAYS portfolio developed in the first four months of the program exceeded that target.

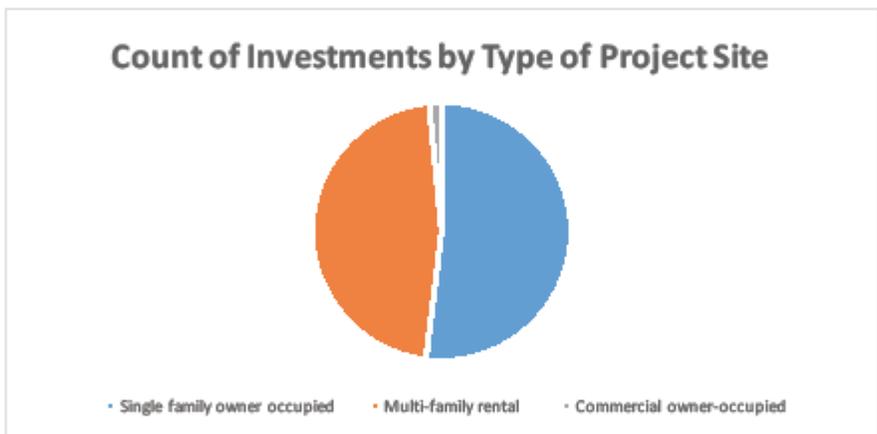
All of these program performance figures substantially exceeded similar metrics for the HELP loan program during the same period for the prior year.

## 1. Distribution of Interested Participants by Type of Project Site

The HELP PAYS® program completed 149 assessments of cost effective energy efficiency upgrade opportunities in buildings served by the utility.

Of the 149 assessments, 85 (57%) were for single family properties, 62 (42%) were multi-family properties and 2 (1%) were commercial properties. All 62 multi-family units were either in buildings with 4 units or were adjoining single-story units sharing one roof.

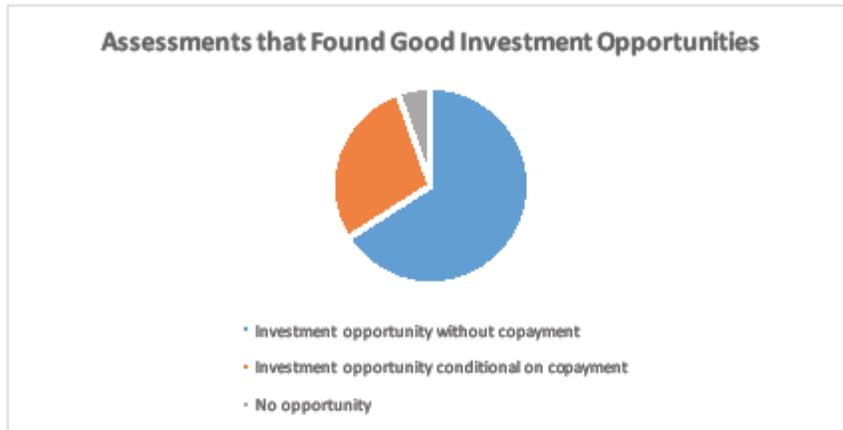
Among the single family properties, 100% were owner occupied. Among the multi-family properties, 100% were rental units. Both commercial properties were owner occupied.



## 2. Results of Assessments of Sites for Cost Effective Upgrades

The PAYS system requires that upgrades be cost effective even after capping the cost recovery charge to 80% of the estimated savings (based on current rates) within 80% of the useful life of the upgrades, assuming no escalation in rates. This assurance provides an assurance of net savings to the program participant. If the upgrades would not meet that threshold, the PAYS system provides an option for a customer to make a copayment upfront in order to assure that the investment will meet the PAYS standard for consumer protection, immediately providing the customer with 20% of the estimated savings.

Out of the 149 assessments, EETility identified investment opportunities at 139 sites, including 103 (69%) that met the requirements of the PAYS® system for cost effectiveness (no copayment) and 36 (24%) that were conditional upon a copayment. Ten (7%) sites did not have suitable investment opportunities.



## Results of Assessments Summarized by Market Segment

Out of the assessments at 85 single family properties, EEtility did not recommend investing at 10 sites due to multiple factors.<sup>2</sup> Investment opportunities were identified at 75 of the 85 sites (88%), including 54 (63%) that met the offer requirements of the PAYS system for cost effectiveness and 21 (25%) that were conditional on copayments.

Investment opportunities were identified at all 62 of the multi-family housing units at two properties, including 49 investments (79%) that met the offer requirements of the PAYS system for cost effectiveness and 13 (21%) that were conditional on copayments by the property owners (landlords).

Investment opportunities were identified at both of the commercial properties, a school and a municipal building. The investment package at one of those sites was conditional on a copayment.

<sup>2</sup> One person died, one moved. These sites can be revisited in the future. One person was only interested in geothermal, which had approximately a 45 year payback. At the remaining 7 sites, the assessment found that the homes already had good energy performance, with only minor upgrades penciling out with minimal savings that would not justify professional installation. The program operator encouraged those customers to undertake these projects independently.

### 3. Acceptance of HELP PAYS® Offers to Invest in Efficiency Upgrades

Overall, 133 of 139 (96%) HELP PAYS® offers were accepted.

#### Offer Responses Summarized by Market Segment

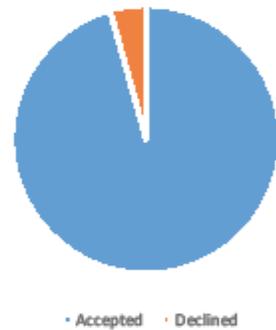
Of the offers to invest at 75 single family projects, 69 (92%) accepted the HELP PAYS® offer, including 48 of the 51 (94%) offers with no copayment needed and 21 of the 24 offers (87%) that were conditional on copays.<sup>3</sup>

Out of the offers to invest in upgrades to 62 units in two multifamily properties, 62 (100%) accepted the HELP PAYS® offer. Both property owners approved all of the upgrades, and they agreed to make the copayments needed for upgrades at 12 units so that these units would meet the requirements of the PAYS system for cost effectiveness.

Of the two commercial customers that received HELP PAYS® offers, both (100%) accepted, including the one that was conditional on a copayment.

Out of the 102 sites across all property types that received a bona fide PAYS offer (no copayment), 99 (97%) were accepted. Out of 36 offers to invest that were conditional on copayments, 33 (92%) were accepted.

Acceptance Rate of HELP PAYS Offers



<sup>3</sup> Of the 6 single family customers who declined the offer, 2 stated they were skeptical and 4 indicated they preferred to install the upgrades themselves.

## 4. HELP PAYS® Total Investments to Date

### a. Distribution of Investments by Type of Project Site

Of the 133 offers accepted, 69 were single family, 62 were multi-family, and 2 were commercial.

The cost of capital the applied to all investments in the program was 4.5%.  
Approximately one third of the total dollar amounts went to each type of project site.

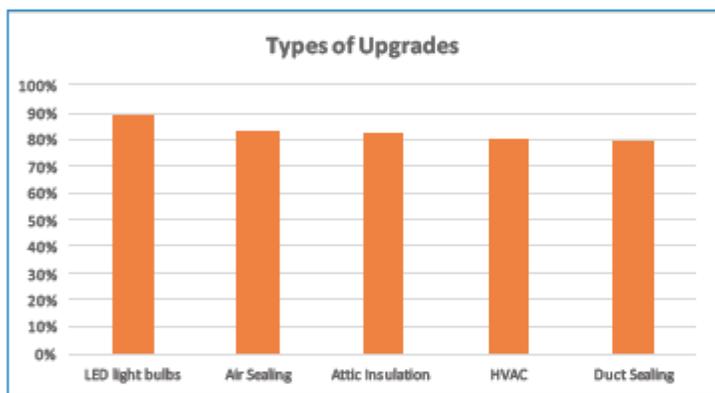
Single Family	\$596,912
Multi Family	\$418,289
Commercial	\$552,981
<b>Total</b>	<b>\$1,568,182</b>



## 5. Types of Upgrades, across all locations

The HELP PAYS® program evaluates five common types of building energy efficiency upgrades, and each of them was included in the majority of the investment packages. The most common upgrade type was installation of LED light bulbs, occurring in 89% of sites where upgrades occurred. Air sealing was the next most common upgrade, occurring at 83% of sites where upgrades occurred.

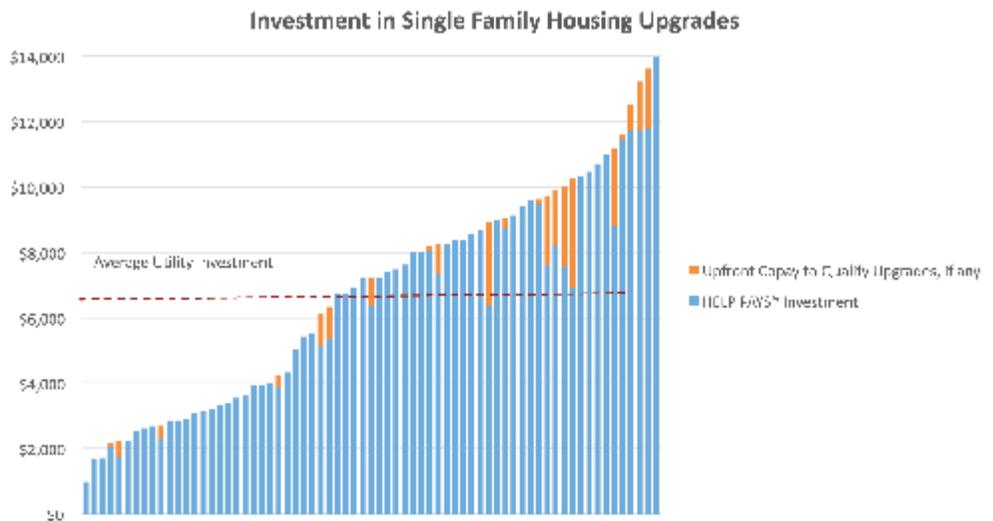
LED light bulbs	89%
Air Sealing	83%
Attic Insulation	82%
HVAC	80%
Duct Sealing	79%



## 6. Project Size and Utility Investment

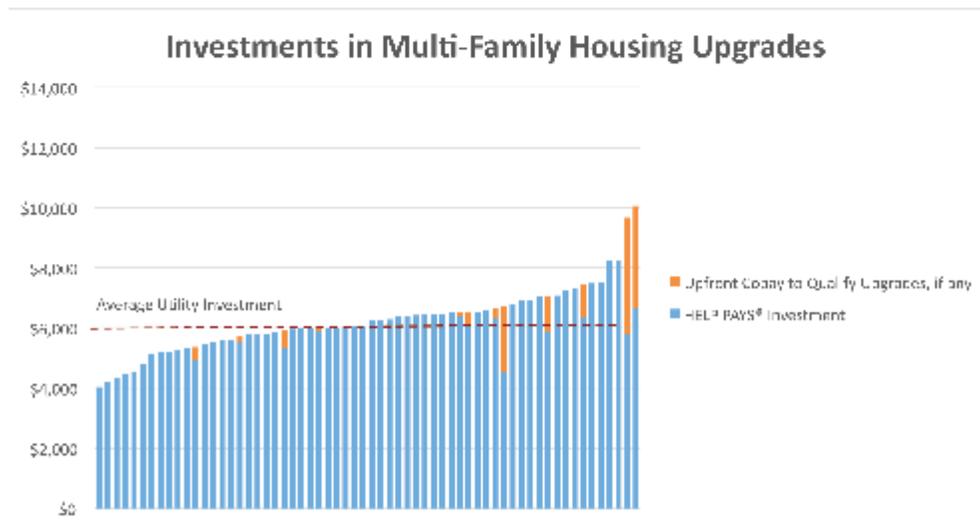
### a. Single Family

Number of Investments:	69
Average Utility Investment:	\$6,387
Sites requiring a Copayment:	20
Percent with a Copayment:	30%
Average Copay, for 21 homes with a copay:	\$1,158



### b. Multi Family

<b>Number of Investments:</b>	<b>62</b>
<b>Average Utility Investment:</b>	<b>\$6023</b>
<b>Apartments requiring copayment (paid by landlord):</b>	<b>12</b>
<b>Percent apartments with a copayment:</b>	<b>19%</b>
<b>Average Copay for 12 apartments requiring copays</b>	<b>\$1,155</b>
<i>* All Copays paid for by landlords</i>	



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## c. Commercial

One municipal project:

City of Hampton

Project investment: above \$20,000

Copayment: above \$2,000

Upgrades included: All five upgrade types

One university campus project:

Southern Arkansas Technical University

Project investment: above \$500,000

Upgrades included: Lighting only

## 7. Estimated Energy Savings

The HELP PAYS® program is primarily serving Ouachita members living in homes built nearly 50 years ago that have not been previously upgraded for energy efficiency. In general, the housing stock is characterized by very energy inefficient homes/apartments, and the results of the program reflect those conditions.

Annual savings are estimated based on the engineering calculations from individual on-site building analyses. These savings are recalibrated after each project is "tested out" using post upgrade air and duct sealing test results and visual insulation and HVAC Quality Control inspections. Ouachita Electric further verifies each project's performance using weather normalized smart meter data.

The average estimated annual savings for both single-family and multi-family participants was above 30%, with a wide range that reflects variation in the quality of the housing stock. Two commercial customers participated: The City of Hampton and Southern Arkansas Technical University. Both projects have average estimated annual energy savings above 25% for the projects scoped. For the university, the project scope was lighting only.

## 8. Estimated Monthly Savings and Cost Recovery

For the customers that are dual fuel, the estimated monthly savings include both gas and electric savings. The estimated monthly savings are based on current rates over the useful life of the upgrades, a condition that is specified in the HELP PAYS® tariff.

As defined in the HELP PAYS® tariff established by Ouachita Electric, the Program Service Charge is the cost recovery charge included on the monthly utility bill until the utility's costs are recovered. The charge is capped at 80% of the average estimated monthly savings based on current rates and a cost recovery period that is capped at 80% of the useful life of the upgrade package.

### a. Single Family

Average Estimated Monthly Energy Bill Savings	\$71.34
Average Monthly Program Service Charge	\$56.26
Average Monthly Estimated Net Savings	\$15.07
Average Monthly Estimated Net Savings (%)	21%
Average Cost Recovery Period	12 years

### b. Multi Family

Average Estimated Monthly Savings	\$65.48
Average Monthly Program Service Charge	\$51.88
Average Monthly Estimated Net Savings	\$13.91
Average Monthly Estimated Net Savings (%)	21%
Average Cost Recovery Period	12 years

### c. Commercial

Average statistics for a sample size of two will not yield meaningful results. The estimated annual savings for the municipal building project is above \$2,000. The estimated annual energy savings for the lighting upgrade on the college campus is above \$90,000. The cost recovery period for the municipal building is 12 years, whereas the lighting project at the university campus has a cost recovery period of 10 years.

## 9. Looking Ahead

Even with more than a million dollars invested, we have only just begun. We are already considering ways to expand the application of our program. For example, our market conditions reward investments in demand response capabilities, so we will study the data from our smart meters to better understand the benefits of demand savings we are achieving with our investments. We are also exploring our opportunity to finance deployment of smart thermostats to add flexibility to our system.

We will seek opportunities to share our experiences and to gain insight from other utilities with similar programs. We have called on the assistance of cooperatives with similar programs, including Roanoke Electric in North Carolina, and we have benefited from the expertise of our own generation and transmission cooperative, Arkansas Electric. With that same spirit, we look forward to engaging more cooperatives interested in offering an inclusive financing solution to their members as well.

We are continuing to learn as we gain experience with program implementation. Some aspects of our program will require a full year of data to begin assessing, and we will continue to make adjustments. In the meanwhile, we are proud to be among the contenders for the national Georgetown University Energy Prize: Our partner, Calhoun County, is the only rural community among the finalists, and we will update this report to close out our quest over the last two years to chart a path that achieves deep savings while also fueling local economic development.

Contractors that participate in the HELP PAYS program are expanding their workforce as the scale of investment grows. Future reports will include information on the jobs supported by the program as well as the program's approach to continuous workforce development to support quality assurance and opportunities for advancement.

For more information and updates about our work, please visit us online at:  
[www.oecc.com/help](http://www.oecc.com/help)

## Acknowledgements

We thank Resource Media for developing the graphic design for this report. Cover photos were taken by staff at Ouachita Electric and Arkansas Electric Cooperative Corporation, which also produced a video that has helped us share the experience of offering inclusive financing to our members.

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